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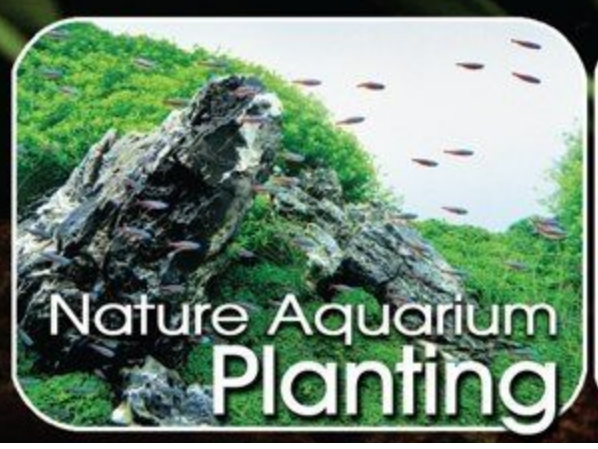

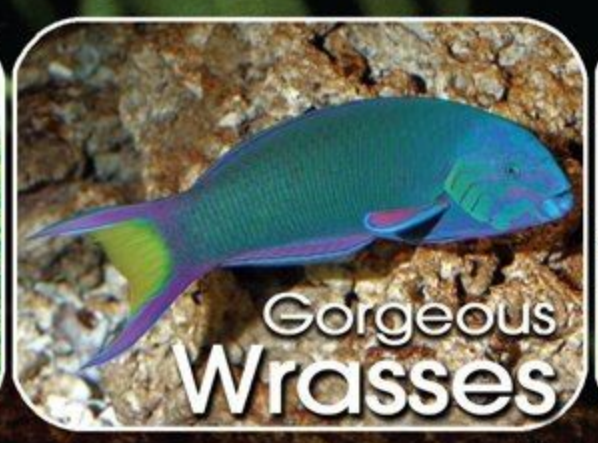

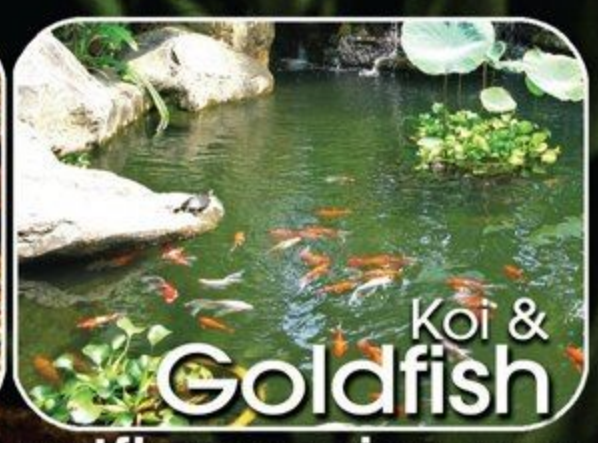

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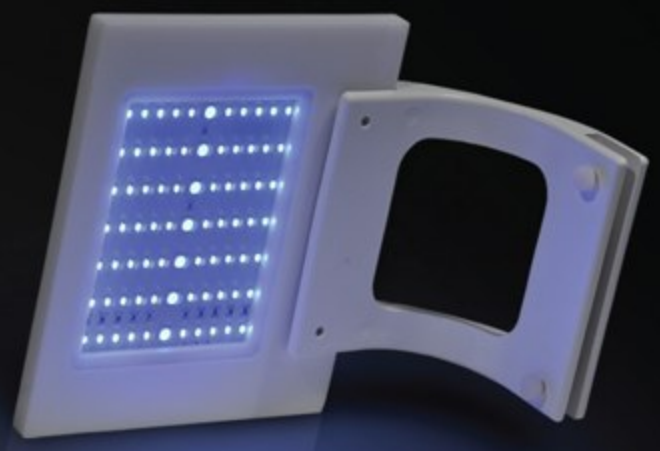

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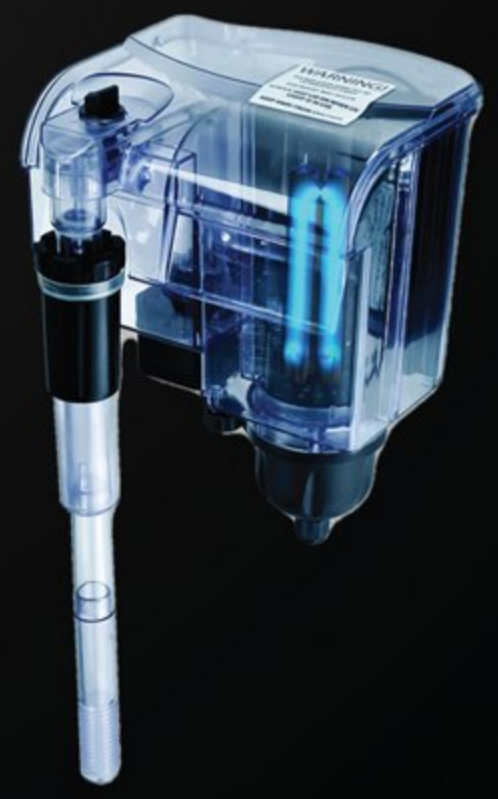

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features

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columns

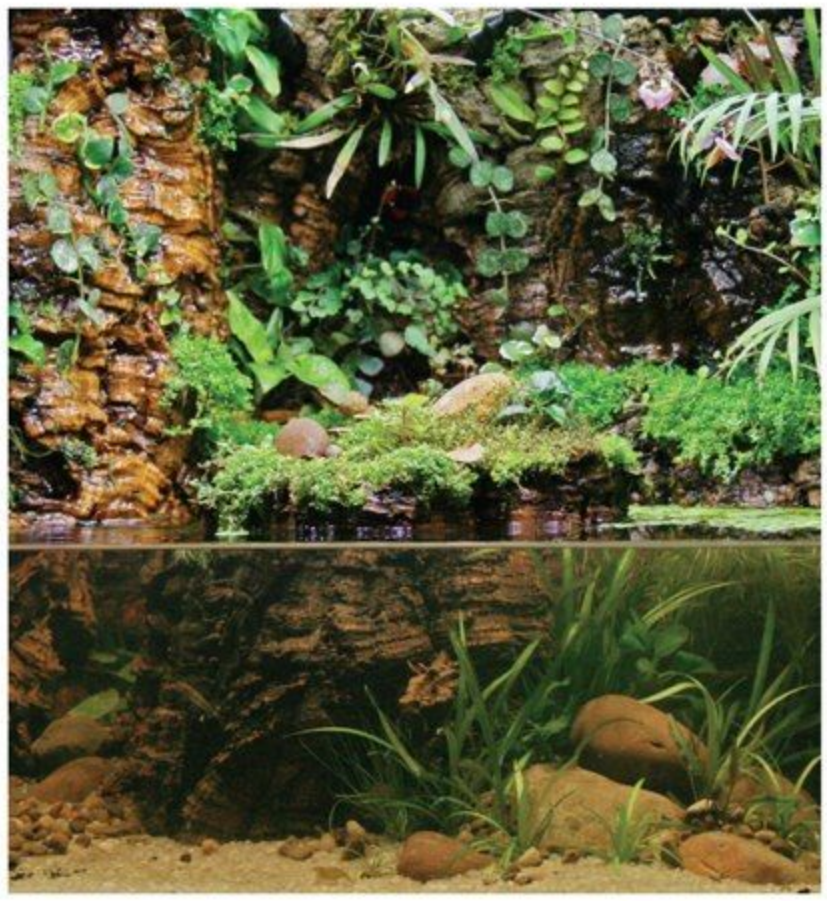
cover

Coming in a myriad of shapes, colors, sizes, and aggression levels, cichlids are among the most popular fish in the hobby. Some species, like the ever-popular oscars and angels, are commonly kept and bred, but others are threatened in the wild and require protection in the hobby. One such example is the yellow lab (*Herichthys labridens* "yellow") gracing our cover, which is cross breeding with an invasive species and wiping itself out of existence. Read about other fish that need your help in "To Save a Life: C.A.R.E.S. Preservation Program" (p. 52).

Photograph by Mo Devlin

Our cover photo is available for your wallpaper and/or screensaver in the downloads section of tfhmagazine.com.

departments



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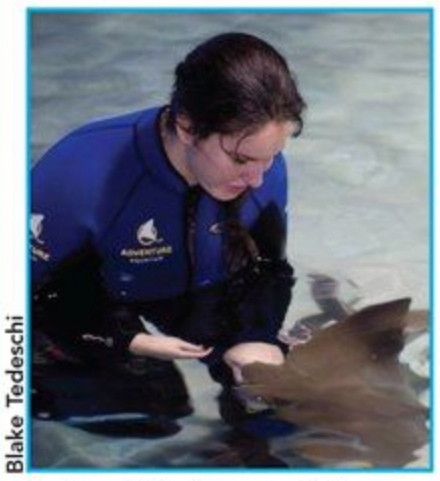
editor's note


Blake Tedeschi

As an aquarist, you probably care about all forms of aquatic life, and you can use your hobby as a tool to help aquatic animals and the habitats they live in. On the most basic level, every fishkeeper is aiding the underwater world; a visitor comes and sees a vibrant display aquarium and is suddenly inspired to care about what is inside. Maybe he or she will even be inspired to set up a tank of their own. However, if you want, you can be even more active when it comes to using the fishkeeping hobby to promote conservation.

The C.A.R.E.S. (Conservation, Awareness, Recognition, Encouragement, and Support) Preservation Program encourages fishkeepers to dedicate a tank (or multiple tanks) to keeping species that are endangered, or close to it, in the wild. By keeping and breeding these species in an aquarium, their genetic information will be saved for future generations. Check out a sampling of cichlids they are working with (p. 52) and find out about one hobbyist's fantastic experience with the program while keeping—and attempting to breed—*Myaka myaka*, an aggressive little cichlid (p. 60).

Speaking of cichlids, the American Cichlid Association (ACA) 2012 convention is coming up on July 11–15 in Indianapolis, Indiana, and *Tropical Fish Hobbyist* is proud to once again be the Official Publication of the convention. The ACA engages in many acts of conservation, and the convention is a great place to see firsthand species that need your help, as well as to meet like-minded fishkeepers, hear excellent speakers, and get a few new things for your fish tanks. If you're lucky, you'll acquire a gorgeous fish like photographer Mo Devlin did at the 2010 convention. His *Paratheraps* sp. "Coatzacoalcos" are now breeding and thriving in his home tanks (p. 56).

Another way to help our fish is to provide them the best environment possible in the home aquarium. Reefer Wes Devers does this with a rather simple technique that any of us can follow: a strict water-testing regimen (p. 90). At the other extreme, Living Color Enterprises, featured on Nat Geo Wild's new program *Fish Tank Kings*, creates elaborate setups for everything from a millionaire's mansion to a public aquarium. They even went down almost 800 feet to collect fish to display in a deep-sea exhibit. We spoke with the guys at Living Color to get a better idea of what the new show is all about, and they want everyone to know that their first priority is the fish (p. 94).

Whether you want to face the challenge of preserving aquatic life head-on and breed an endangered species, or you prefer to let your fascinating home setup serve as a way to promote the preservation of aquatic life, remember—we're all in it for the fish!

Shari Horowitz
Managing Editor
Tropical Fish Hobbyist

readers' forum

Facebook Readers Respond: In honor of our cichlid issue, we asked: What type of cichlids do you keep, and which ones are your favorites?

I have African cichlids from Lake Malawi, three parrots, and a *Tilapia buttikoferi*. My favorite is the parrots. They are so funny to watch. All have adapted to the same water conditions. The TB grew up with the others but always went after the parrot. I had to separate the TB. He is alone in a separate tank. Too aggressive now.
Lisa Mojica

I keep ram cichlids because they are small and peaceful, and I like a community tank. I plan to get some angels for the same reason.
Jeff Damal

Africans! I have two green terrors only because they can hang with my more "social" cichlids. I love my fish and can't wait for this issue.
Elliott Anderson

I have a 120-gallon of all Africans. The *brichardi* keep spawning. Lots of fry. Favorite South American is *Geophagus jurupari*.
Jim Pohlson

We are just starting a 100-gallon cichlid tank. We have convicts, Jack Dempseys, Texas cichlids, red jewels, and a couple of others. The convicts just had babies. They are guarding them like soldiers.
Stephanie Lynn Moore

I keep angels, daffodil brichardi, and have a 215-gallon tank full of *Geophagus iporangensis*. Favorite—can I claim all of them? I haven't met a fish of any species that I don't love, but the *Geophagus iporangensis* are probably the most fun I've had in a long time. Easier (and not as big) as Oscars, but just as much personality and incredible color.
Dawn Moneyhan

Firemouth cichlids that were born in my tank perhaps a year and a half ago.
Tango Leama Langdon

Jack Dempseys are like the dogs of the cichlid world! Mine liked to be petted on the head and were good at killing other fish while being a friendly, playful pet to me. They can live forever and get huge. I love all cichlids, but Jacks are the best.
Lynda Travers

Convicts, Oscars, dovii, pearls, crims, nics, and Africans are what we have in our tanks at the moment. My husband prefers Central Americans and I adore Africans, Lake Malawi in particular.
Savvy Small

I love cichlids, and part of my collection includes a breeding pair of green severums, breeding pair of rainbows, various angels, and a stunning female Jack Dempsey that I would love to pair up and breed from, but my dream cichlid that is on my wish list for the future is a jaguar cichlid—I think these are awesome fish.
Andi Harris

Red devil cichlid. I have one about 10 inches big. His name is "Jerk." It's true what they say; they do have their own personality.
Joshua Elway

To send a question or comment to "Readers' Forum," email letters@tfh.com. All letters sent to *TFH* may be edited and published at the discretion of the editors and publisher; due to the volume of mail we receive, we are unable to respond personally to all communications, but every message is read.

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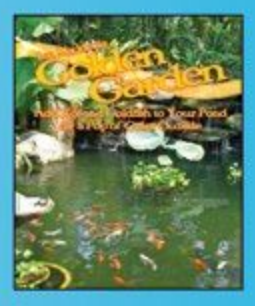
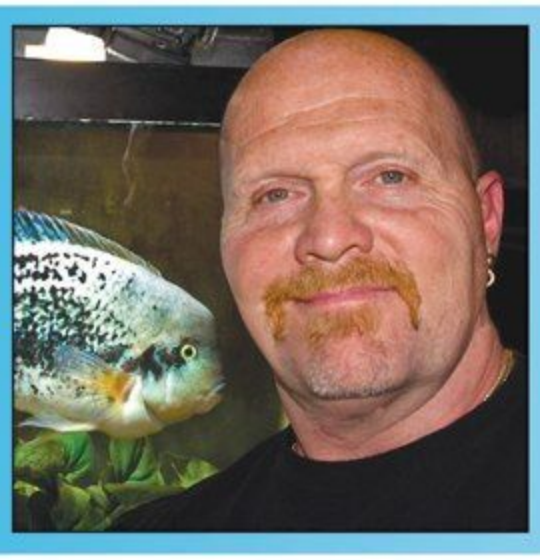


lea madocks

In This Issue: "I have always admired koi as the living jewels they are so often referred to as. While I lack the space for one at my home, a family member has a smaller koi pond which I love to visit, as the koi are both peaceful and entertaining to watch. They are also friendly fish who learn to recognize their owners and are inquisitive of new people, always swimming over to watch you and beg for treats. It is a desire to eventually build a large koi and goldfish pond at my home and complement it with a beautiful water garden."

Owner: Acumen Aquatics (www.acumenaquatics.com).

On Going Pro: "Research everything. Know precisely what you plan to do and wish to achieve. Consider the time and money you wish to invest, setup and insurance costs, etc., and talk to those in the business locally before you start. Don't be afraid to ask questions. Above all, make sure you will continue to enjoy your hobby both privately and as a professional."



mo devlin

In This Issue: "The entire *Paratheraps* group has always been of interest to me. *P.* sp. *'Coatzacoalcos'* is a relatively new cichlid to the American hobby. I like the challenge of keeping and learning about something new in my fish tanks. The fact that they are beautiful and photograph well is a bonus."

Other Works: "Today in the Fishroom" series on web forums, articles for the *Buntbarsche Bulletin*.

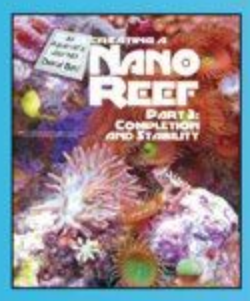
Why Aquatic Photography: "Aquatic photography just happened. I have had a camera in my hands for over 40 years. Photography dovetailed nicely into my love of the cichlid fishes. A good friend of mine once said that one thing is guaranteed. If Mo gets the fish in a tank, its life will be well documented. I would like to believe that taking pictures of the cichlid fish is in some way my contribution back to the hobby. Lots of people have seen the photos and then acquired the fish."

pam chin

In This Issue: "I decided to write about an at-risk species to spread the word! C.A.R.E.S has just updated their list of at-risk cichlids, and many of my beloved Rift Lake cichlids have been added. Education and awareness are the keys to keeping hobbyists informed. Species maintenance is where it is at, and we can do it! If each hobbyist can maintain one species, together we will be able to maintain many species for future hobbyists to come."

Other Works: "Ask Pam" column and other cichlid articles.

Why C.A.R.E.S.: "I have been very fortunate to be able to observe many cichlids in their natural habitats over a period of years, and I have witnessed habitat deterioration first hand. As a die-hard cichlid keeper, I know that many species have already slipped through our hands. The only way we can keep this from happening again is to have an organized species maintenance program like C.A.R.E.S."



david bell

In This Issue: "A significant number of reefkeepers are entering the realm of nano systems, either as beginners or as seasoned veterans who are adding a smaller aquarium or simply downsizing. I have spent significant time conversing with these folks and helping them plan their nano-reef project. My two-part article is really a journal of the assistance I have been providing for the past several months, and now I want to share basic reef-building concepts to an even larger audience."

Other Works: "The Clowns of the Tomato Complex" and other articles in *WetWebMedia* digital magazine.

Favorite Aquarium Setup: "Aside from my nano-reef system, my other favorite system is my large soft-coral reef, which features seven genera and ten different species of wrasses! The labrids are one of my favorite fish families for many reasons, and selecting the right mix of them, along with other fish families, proved to be successful, but a real challenge. I had never seen this done with wrasses before; I believe the results have been spectacular. This tank is extremely colorful and active, as one might imagine."

also in this issue: Takashi Amano, Jack Wattley, Ted Judy, Charles Clapsaddle, Mark Callahan, James Fatherree, Klaus Steinhaus, Greg Steeves, Lawrence Kent, Troy Veltrop, Wesley Devers, Rose and Tony Orso

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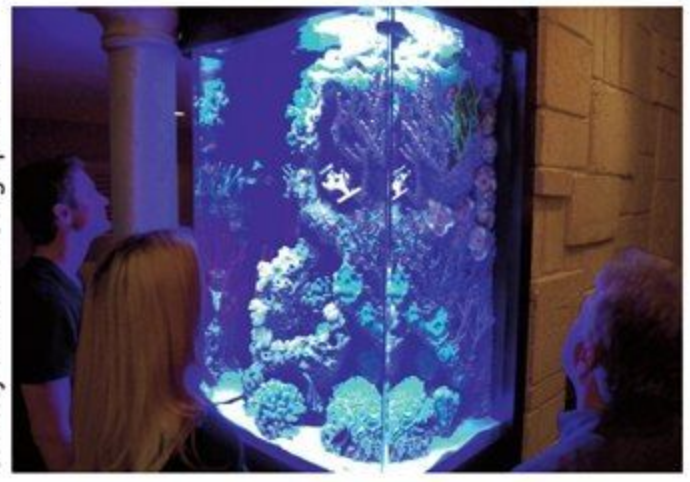
Fish Tank Kings

The new show *Fish Tank Kings* on Nat Geo Wild is bound to feature some incredible setups coming in all shapes and sizes, as well as the seemingly insurmountable challenges that must be faced in order to create them. If you're excited about the show and want to see more, be sure to check out the trailer on the Aquatic Videos blog.



Courtesy of National Geographic Wild

Create Your Own Central American Biotope

Are you looking to set up a new tank but don't know where to begin? If you're tired of the classic mishmash community tank, want to replicate a specific environment, or you simply want to teach your kids about a particular region, a biotope tank might be the perfect option for you. A great choice is a Central American biotope, featuring feisty cichlids. Visit the *TFH* Extras blog to learn how to make your own.

Aaron Norman

Water Testing How-To

If you enjoy Wesley Dever's article on water testing but are still concerned about how to test the water in your own tank, have no fear; *TFH* is here to help. Check out the Aquatic Videos blog to watch how a pro tests some of the most important water quality parameters in a reef tank, including tests for specific gravity, ammonia, pH, and much more.

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Problems with Tap Water Additives

Municipal water has three additives that you need to remove from your tap water before it can be added to your aquatic environment.

First, Ortho-phosphates, used to prevent corrosion of pipes, will increase the risk of an algae bloom as they breakdown into simple phosphates.

Second, hydrolysable phosphates, added to bind iron and prevent scaling, will breakdown into simple phosphates as well.

Finally, chlorine/chloramines, added to prevent microbial growth, are toxic to your aquatic environment and chloramines have been shown to increase the level of lead in your tap water.

So what is the most effective way to prevent these tap water additives from compromising your aquatic system?

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The Amano Shrimp

The Amano shrimp (*Caridina japonica*) is an elegant invert with tiny details that are best exposed through macro photography. Photographer Nou (Nick) Xyong used a remote flash unit for a natural, dispersed lighting that allowed him to capture the animal's more delicate features, such as the tiny grooves and notches on the carapace and the ridged texture of the antennas. A smaller aperture setting (f/11) was used for a deeper depth of field.

The algae-grazing Amano shrimp (named after aquascaping expert Takashi Amano, who introduced it to the aquarium hobby more than two decades ago) is a hardy and attractive addition to many planted setups, where it earns its keep grazing algae off leaves and other surfaces.

Photo Equipment:

Canon EOS 60D • Canon 100mm f/2.8 macro lens

Q&A freshwater

Q Rating Difficulty of *Apistogramma borellii*

How hard would you say it is to keep *Apistogramma borellii* compared to other apistos? I've heard that some apistos really need soft, acidic water, but my tap water is slightly hard and alkaline. I'll try this species only if it will do okay in my water without having to fool around adjusting the pH and hardness.

Edgar May
via email

A *I'd say* A. borellii, *commonly known as the umbrella cichlid, is definitely one of the better apisto choices for your water conditions. While this species will thrive in soft, acidic water, it isn't especially fussy in this regard, as its rather expansive natural range (Argentina, southern Brazil, and Paraguay) includes waters of varying chemistries. In other words, your slightly hard, alkaline water should suit* A. borellii *just fine, even for breeding purposes if that's your intent. It's also noteworthy that, owing to the fact that this species' natural range extends quite far south compared to that of other apistos,* A. borellii *can tolerate much cooler water than many of its congeners can.*

Q What's Wrong with Algae?

Why are aquarium hobbyists so concerned about keeping algae out of their tanks? It seems to me that an aquarium with no algae is kind of unnatural. Apart from cleaning the front glass so I can see the fish better, I just let it grow. Is there some reason I shouldn't do that?

Maureen Steadman
Philadelphia, Pennsylvania

A *Algae growth is perfectly natural, and the presence of algae in an aquarium is generally not harmful to the fish. In fact, it can be beneficial to herbivorous species and to fry that feed on tiny life forms inhabiting the algae. That being said, excessive algae growth—which is not normal in a balanced natural aquatic ecosystem—can be problematic in aquariums from several standpoints. In addition to being unsightly, excessive algae growth indicates that the level of dissolved nutrients is too high, which can be harmful to more sensitive fish species. Also, algae growing in abundance can be detrimental to aquarium plants. For instance, green water caused by unicellular, free-floating algae can deprive plants of the light they need for efficient photosynthesis, and filamentous hair algae can overgrow and smother plants' foliage directly.*

If you aren't trying to cultivate aquarium plants and aren't put off by the cosmetic appearance of the algae in your tank, there's no reason you can't allow it to grow. Just keep in mind that it's important to maintain balance and that excessive algae growth is one indicator of a larger water-quality issue that needs to be remedied for the health of your fish.

got a question?

Send your questions about the freshwater side of the aquarium hobby to "Q&A," T.F.H. Publications, P.O. Box 427, Neptune, NJ 07754, or submit via e-mail to editor@tfh.com. For answers to more time-sensitive questions, opinions on your setup, or just to converse with like-minded members of the aquarium community, please visit the *TFH* Forum at forums.tfhmagazine.com.

Q Bubblenest-Building Catfish?

Is it true that the black marble hoplo catfish (*Megalechis thoracata*) builds a bubblenest for breeding like bettas and gouramis do?

Drew Pollock
via email

A Megalechis thoracata, *commonly known as the black marble hoplo, bubblenest catfish, black-spotted catfish, and probably a handful of other appellations, does build bubblenests (as do several closely related species) to receive fertilized eggs in much the same manner as many labyrinth fishes do. It's the male of the species that constructs and maintains the nest, often incorporating bits of vegetation, and stands guard to protect it and retrieve fallen eggs.*

If you're interested in this species, it is fairly commonly available in the hobby. M. thoracata *reaches about 5 inches in total length and is best kept in groups of at least five individuals with only one male per tank. This species is not at all fussy in terms of water chemistry, but, being a thick-bodied fish that feeds and excretes on the heavy side, it demands a relatively large, robustly filtered system. I would recommend a minimum of 40 gallons for a group of five or six.*

Andrzej Zabawski

■ Having an expansive natural range, the umbrella cichlid (*Apistogramma borellii*) will do well in a variety of water conditions.

Andrzej Zabawski

■ Similar to many labyrinth fishes, the black marble hoplo catfish (*Megalechis thoracata*) builds bubblenests for breeding.

Q Nitrite and Hyper Fish

I have a 20-gallon freshwater aquarium that contains four swordtails (one male and three females), five platies, seven leopard danios, and a pleco. My problem is that the fish are acting really hyper; they seem nervous and are breathing much more rapidly than normal. The danios have even started swimming directly into the glass. I tested the water and got a nitrite reading of .25 ppm. Could that be why the fish are acting so hyper? I'm also wondering whether the male swordtail could be part of the problem because he likes to chase the other fish around.

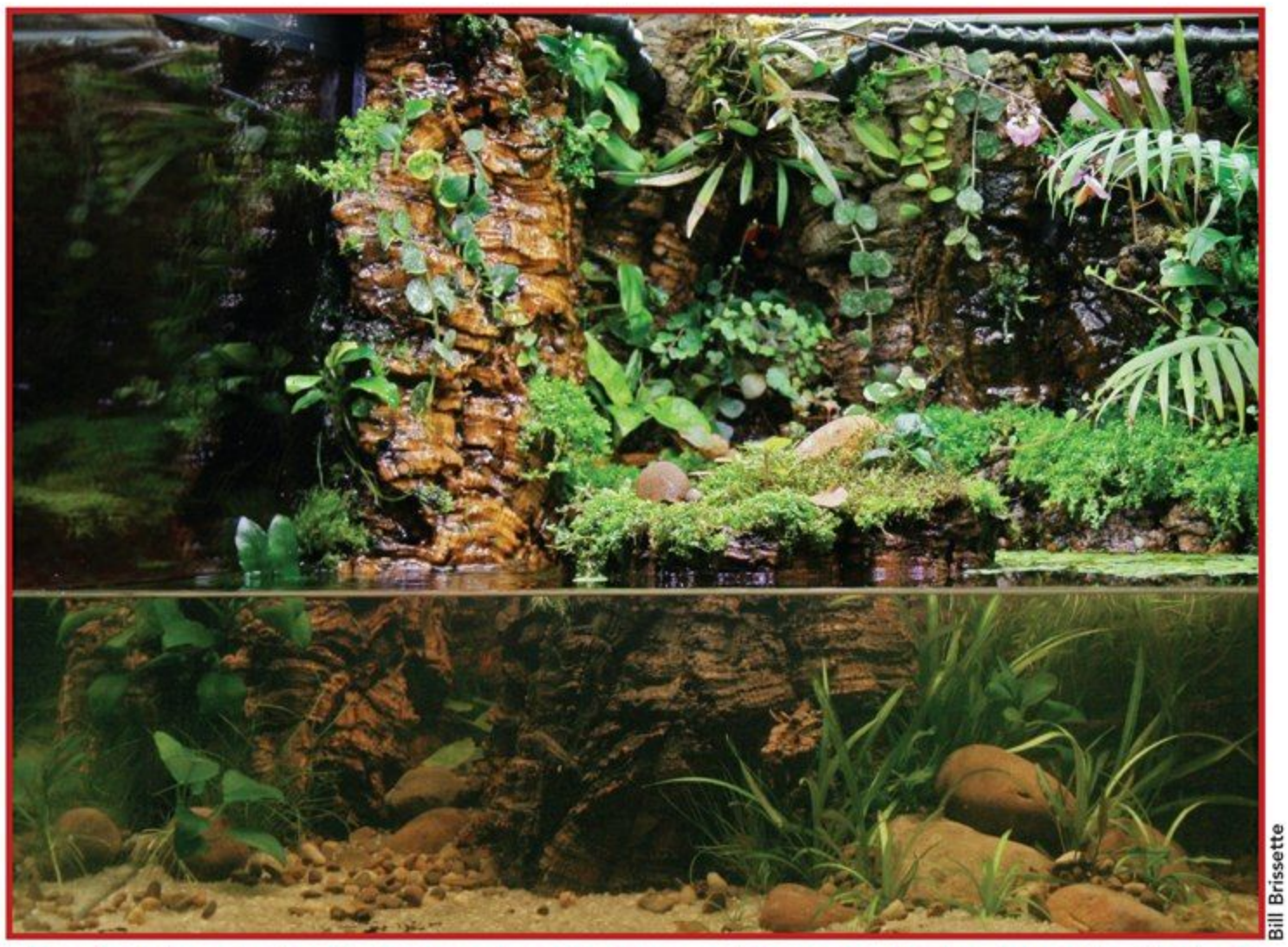
Bob Reinhart
Urbana, Illinois

A *A bullying male swordtail can certainly cause the anxious behavior you're observing, but so can the presence of nitrite, and that is definitely the more pressing of the two issues right now. Nitrite is deadly to fish, and you shouldn't be detecting it in any amount in a fully cycled, appropriately stocked system. The first thing you need to do is perform a major water change to dilute the nitrite. Then you must immediately address the problem that is causing the nitrite to build up—which is the fact that your tank is grossly overstocked and the excessive bioload is overwhelming your biological filter (which may or may not have been fully mature to begin with). For starters, you need to figure out the exact species of "pleco" you have so you can determine how large it will ultimately get. Many species sold under this common name (and there are lots of them!) get way too big for a 20-gallon tank. Then, whether or not you decide that you can reasonably keep the pleco, I would recommend reducing your other livestock to, perhaps, just the swordtails or just the platies and/or danios. Once you've sharply reduced your stocking level, your biofilter should come into line with the bioload so you no longer detect nitrite. Nonetheless, continue testing the water and keep up with those water changes!*

Q Riparium Explained

While researching planted aquaria, I've come across the term "riparium" several times. Can you explain to me what this is? Is a riparium the same thing as a paludarium (another term I keep seeing)?

Jason King
via email



Bill Brissette

■ A paludarium is classified as a setup with an aquatic area and a land area that typically contains terrestrial plants.

A *Superficially, a riparium is very similar to a paludarium, but there is a distinction between the two. In a riparium, the plants are typically rooted in the aquarium substrate (or in some type of floating planter) but their foliage grows emersed, i.e., extends above the water surface, which is commonly kept lower than it would be in a normal aquarium. This type of system essentially represents the marginal area of a pond, lake, river, or other body of water. A paludarium, on the other hand, features both an aquatic area and a distinct land area that typically contains terrestrial plants. A river bank, beach, or other area where land meets water can be represented with a paludarium. Of course, you could also set up a system that borrows elements from both worlds. Or, you could incorporate fully aquatic plants in addition to the emersed or terrestrial plants in either setup. The possibilities are limited only by your imagination!*

Splash Tetra Reproduction

Q I understand that there is a tetra that lays its eggs on leaves overhanging the water. How in the world does it manage this trick?

John Walters
Atlanta, Georgia

A *The tetra you have in mind is, no doubt, the aptly named splash tetra* (Copella arnoldi) *of South America. To lay eggs on foliage*

overhanging the water, the male and female join together at the surface, simultaneously leap out of the water, and cling to a leaf for several seconds. During this brief interval, the female deposits several eggs and the male immediately fertilizes them. The two then drop back into the water and then repeat the process multiple times until egg laying is complete. But the remarkable behavior doesn't end there. After the eggs have been deposited, the male chases the female away and positions himself beneath the eggs, splashing them with a flick of his tail at regular intervals to prevent them from drying out until they hatch approximately three days later and drop down into the water. Truly a remarkable reproductive strategy!

Andrzej Zabawski

■ The splash tetra (*Copella arnoldi*) utilizes a remarkable breeding strategy that involves laying its eggs on leaves hanging over water surfaces.

Q Maintaining Brackish Conditions

Having kept freshwater aquariums successfully for several years, I recently decided to try something different by setting up a brackish aquarium, specifically for figure-8 puffers. I read online that a specific gravity between 1.002 and 1.005 is suitable for this species, so I settled on the high end of that range and added the right amount of salt to the water. For the first few days, the specific gravity hovered right at 1.005, but then it began to climb and it continues to rise slowly. I've never worked with salt mixes before, so I'm not sure what I'm doing wrong. I haven't done any water changes yet, just top-offs for evaporation. The tank is still cycling and no livestock has been added, so no fish are in danger, but I really need to figure out how to maintain a stable specific gravity. Any thoughts?

Jerrod Zeller
via email

A *I think you're seeing in action a principle that's not usually a concern for freshwater hobbyists (with certain exceptions, such as those who keep African Rift Lake cichlids) but is important to every brackish or saltwater aquarium hobbyist. That is, when evaporation occurs in brackish or sea water, only pure water evaporates, not the salt dissolved in it. So, the more water that evaporates, the higher the specific gravity will climb in the aquarium. To compensate for this, you have to replenish the evaporated water with fresh water, not brackish or sea water. My guess is that you're topping off with brackish water, which means you keep adding even more salt to the system with each top-off. Now, any time you perform a water change—which removes both the water and everything dissolved in it—you would then want to refill your tank with brackish water, not fresh water, in order to prevent the specific gravity from dropping.*

Andrzej Zabawski

■ The pictus catfish (*Pimelodus pictus*) has a propensity for gobbling up smaller tankmates.

Q Pictus Catfish and Vanishing Tetras

I have a 55-gallon South American tank that is stocked with eight neon tetras, seven glowlight tetras, six bleeding heart tetras, three angelfish, and five pictus catfish. I originally had a dozen each of the neons and glowlight tetras, but they've been disappearing overnight and I'm guessing they're getting eaten because I never find a body. Are the angelfish or pictus cats the more likely guilty party? I somehow doubt it's the pictus cats because they usually ignore all the other fish in the tank.

Greg Mominy
via email

A *Large angelfish will eat small tetras such as neons and glowlights, so depending on the size of your angels, it's possible that they're the guilty party. However, I have a pretty strong inkling that if you could somehow take an X-ray of your pictus catfish* (Pimelodus pictus)*, you'd discover suspiciously tetra-shaped remains in their bellies.* P. pictus *is notorious for gobbling up any tankmates small enough to fit in its mouth, and this species has quite a capacious maw for its body size (only about 4 inches in maximum length). Also,* P. pictus *is nocturnal by nature, so it's more likely to do its dirty work at night while you—and those tasty, bite-sized tetras—are sleeping. The simple fact is,* P. pictus *and small tetras cannot be kept together without the latter sooner or later becoming a meal.*

Q Upside-Down Catfish Tank

I'm a 13-year-old hobbyist, and I'm really interested in the upside-down catfish. Would it be okay to keep five or six of them in my 29-gallon tank, or will they fight with each other? How should I set up the tank for them?

Noah Harding
via email

A *Your 29-gallon tank should be just fine for a group of five or six upside-down catfish* (Synodontis nigriventris)*, Noah, as long as you don't put a lot of other fish in the tank. And no, you don't have to worry about them fighting with each other. In fact, this species is very peaceful and really likes to be kept in groups. Upside-down catfish like to have their bellies pressed up against some type of solid surface, so the best way to set up the tank is with lots of horizontal structure, such as branching driftwood; rock caves, ledges, and overhangs; and arching and floating plants. Aquascaping your tank this way will encourage your catfish to swim upside down at different levels of the tank so you can observe and enjoy this fascinating behavior.*

Q Weaning Oscar Off Feeder Fish

I have a large (approximately 8-inch) red oscar that will eat nothing but feeder fish. A fellow hobbyist with a lot more experience than I told me that I need to wean him off the feeders as soon as possible, but every time I've tried giving him different foods, he won't have anything to do with them.

What happens if I never succeed in getting my oscar to eat something different?

David Franks
Jacksonville, Florida

A *Your fellow hobbyist gave you a good piece of advice! Feeder fish present all kinds of potential problems. Not only are they capable of transmitting a host of diseases to aquarium fish, but they also tend to be in a starved, malnourished state themselves, so they are of little nutritional value to the fish that eat them. What's more, many of the species commonly sold as feeders, such as goldfish and rosy reds, are high in fat, which promotes obesity and problems like fatty liver disease. If you don't wean your oscar off feeder fish, what will likely happen is that its health will eventually suffer. If it doesn't succumb rapidly to an acute parasitic, bacterial, or viral disease introduced with the feeders, it will, at the very least, have a shortened lifespan as a result of a nutritional deficiency or obesity-related ailment.*

You mention that you've tried other foods before to no avail, but I wonder whether you've really given your oscar sufficient time to accept alternative foods. Oscars can usually be enticed to accept different offerings, but it may take time and patience. You might start out with a different—and safer—live food option. Earthworms (collected from chemical-free soil, of course) are an excellent choice because they're nutritious, won't transmit disease to fish, and often prove irresistible to oscars with their wriggling.

I would also recommend eventually phasing in a high-quality pellet food—though this may require repeated attempts while withholding other, more tempting foods so your oscar will get hungry and curious enough to try something new.

Q Finding a Fork-Tail Loach

I saw some photos online of a really cool, eel-like loach called the fork-tail loach. Do you have any idea how I can get one? I've never seen this fish for sale at any of my local fish stores. Can you tell me anything about its care in case I am able to get hold of one?

Timothy Quinn
via email

A *The loach in the photos you saw might have been* Vaillantella maassi *or, perhaps, another member of the* Vaillantella *genus. I don't believe I've ever seen this species in the flesh at my local fish stores either, but you should be able to get hold of one by special order through a local dealer or via an online source.*

V. maassi *is found in relatively fast-moving, well-oxygenated, cool waters, so it's important to provide these conditions as well as robust filtration in an aquarium containing this species. A good target water temperature is somewhere in the high 60s to middle 70s. Dissolved nutrients must be kept very low. The exact pH and hardness values aren't critical, provided they don't lean to the extreme. A non-abrasive sand substrate is recommended, and ample hiding places should be provided. While many of the loach species commonly available on the aquarium market are best kept in groups,* V. maassi *tends to be territorial toward conspecifics, so a large tank is necessary if you want to keep more than one. Good options for feeding include insect larvae and small crustaceans, such as mysis shrimp, brine shrimp, blood worms, and mosquito larvae, along with a quality sinking pellet food.*

Q&A saltwater

Q Anemone Crab Without Anemone

Would it be okay to keep an anemone crab without an anemone? A local dealer has some for sale that I believe to be a *Neopetrolisthes* species based on photo comparisons.

Budd Albertson
via email

A *While I've heard reports of hobbyists successfully keeping* Neopetrolisthes *crabs without a host anemone, I'm inclined to discourage this practice, as I've heard just as many (if not more) accounts of these tiny, vulnerable crabs dying quickly when no protective host anemone is present—particularly in systems containing fish or motile invertebrates known to predate on ornamental crustaceans. Also,* Neopetrolisthes *crabs feed by capturing suspended organic particles with specialized feathery appendages and, therefore, tend to be highly prone to starvation in more sterile aquarium systems, such as the average reef tank.*

Q Quarantine Question

I've been in the marine aquarium hobby for a number of years, but I've always been apathetic about quarantining new specimens—that is, until a while back when I ended up with a major ich outbreak that killed all but three of my fish. After going through that hassle, I'll never skip quarantine again! I've since completely torn down that tank, and I'm starting over again from scratch. But this time I want to do everything the right way from the start. One question I have is how far in advance of buying the fish do I need to set up the quarantine tank? After the display tank is initially stocked, do I need to keep the quarantine tank in operation and cycled for any future livestock additions?

Phil Godfrey
Nashville, Tennessee

A *Your quarantine tank will, of course, need biological filtration, so you can either set it up several weeks in advance and begin introducing ammonia so it has a chance to cycle completely before any fish are added or you can borrow a biofilter from another tank or a fellow hobbyist's tank (for example, several porous rocks from an established system that are already populated with nitrifying bacteria) and place it in your quarantine tank when the fish are added. In this latter case, you wouldn't really need to set up the quarantine tank ahead of time.*

Once initial stocking is complete, you can go ahead and tear down the quarantine tank if you so desire. Just be sure to place those extra rocks or another biofilter medium somewhere in your aquarium system—e.g., down in the sump. Be forewarned, however, that if you have to treat the quarantine tank for any diseases, you should not reuse the same biofilter medium or place it in your display tank. It's best to put a new medium in your aquarium system and let it become colonized with nitrifying bacteria before using it in a quarantine tank. That way, you'll always have a ready-to-use biofilter on hand and you can just set up your quarantine tank on an as-needed basis in case you decide to buy more specimens down the road.

got a question?

Send your questions about the saltwater side of the aquarium hobby to "Q&A," T.F.H. Publications, P.O. Box 427, Neptune, NJ 07754, or submit via e-mail to editor@tfh.com. For answers to more time-sensitive questions, opinions on your setup, or just to converse with like-minded members of the aquarium community, please visit the *TFH* Forum at forums.tfhmagazine.com.

Q Wanted: Mid-Sized Angelfish

Can you recommend a good angelfish species for a 125-gallon aquarium? I'm looking for a nice focal-point species that is larger than the 3- to 4-inch dwarf angels but small enough to remain in my tank throughout its life. Also, I'm looking for a species that is fairly easy to keep.

Terrence Martinez
via email

A I can think of several reasonably hardy angelfish species that might fit the bill here. Just keep in mind that the overall suitability of any species I mention would depend on the other fish currently in your aquarium, the presence or absence of sessile invertebrates, the availability of open swimming space, and a host of other factors beside the size of your tank. So, be sure to research the characteristics and requirements of any species that might interest you.

One of the first species that comes to mind is the scribbled angelfish (Chaetodontoplus duboulayi)*. This angel is a real visual stunner and, reaching around 10 inches in maximum length, should be a good fit for your 125-gallon. You might find other* Chaetodontoplus *species that are similar in size and hardiness, as well.*

Or how about the Indian yellowtail angelfish (Apolemichthys xanthurus)*? Though not quite as large as* C. duboulayi, A. xanthurus *still reaches a respectable 6 inches and is very hardy and attractive. Also, don't rule out angels of the* Centropyge *genus (the so-called dwarf angels) altogether. Some* Centropyge *angels grow significantly larger than the 3 to 4 inches you cite. For example, the keyhole angelfish* (C. tibicen) *reaches 7½ inches in length, and Eibl's angelfish* (C. eibli) *and the lemonpeel angelfish* (C. flavissima) *reach between 5 and 6 inches. If you don't mind a slightly different body shape than is typical of marine angels, you might consider Lamarck's angelfish* (Genicanthus lamarck)*, one of the so-called swallowtail angelfishes, which reaches about 9 inches.*

Of course, this is just a sampling of species that might be suitable. A little research in books and online should yield other possibilities that appeal to you. Again, just be sure any angel you decide to buy will coexist peacefully with your existing livestock and that you're prepared to meet its dietary and other care requirements.

Teguh Tirtaputra/Shutterstock

A host anemone is crucial to the survival of *Neopetrolisthes* crabs.

Ian Scott/Shutterstock

The scribbled angelfish (*Chaetodontoplus duboulayi*), which reaches about 10 inches in maximum length, is both great looking and fairly easy to keep.

Q Saving Nurse Shark

A fish store in my area that specializes in marine species has a nurse shark for sale. I'd say it's somewhere around 2 feet long right now. I know nurse sharks aren't ideal for the home aquarium, but I think the shark will have a better chance of surviving in my 300-gallon tank than in the terribly undersized tank it's in now or in a novice hobbyist's tank. Do you think it's worth saving the shark and perhaps offering it to a public aquarium if it outgrows my tank?

Jackson Bartholomew
via email

A It's not a question of if the nurse shark (presumably Ginglymostoma cirratum) *will outgrow your 300-gallon tank, but when.* G. cirratum *can max out at around 14 feet in total length, necessitating an aquarium in the many thousands of gallons. Now, most specimens are unlikely to grow that large, but even if the specimen reaches only half that potential size, it'll be way too much fish for your system. Simply put, there is no home aquarium that can accommodate this species for the long term, and it's astonishing to me that there are still dealers out there who continue to offer these sharks to hobbyists. You won't be saving this specimen by bringing it home; you'll be merely*

Iliuta Goean/Shutterstock

■ Purple tang (*Zebrasoma xanthurum*); herbivorous tangs should be offered a wide variety of greens, including different types of marine algae and a prepared formulation for herbivores.

postponing its inevitable demise. Plus, you'll be reinforcing the inexcusable practice of selling these tankbusters with your dollars. With respect to offering the shark to a public aquarium once it grows too large for your tank, don't waste your effort. Every day, public aquariums are inundated with requests to take oversized specimens off hobbyists' hands, and it very seldom works out that they can—or are willing to—accommodate them in their collections.

Q Nothing but Nori for Tang?

An acquaintance of mine feeds his purple tang nothing but nori, and he says it is doing very well on that diet. Do you agree that nori by itself will provide adequate nutrition for tangs? It seems to me that it would be healthier to alternate greens.

Brendan George
via email

A *I'm with you on this one. And I would raise the question, how long has your friend's tang been "doing very well" on such a limited diet? While a purple tang might survive on nothing but nori (the dried green marine algae used to make sushi), it probably won't thrive on such a limited diet and I would think its longevity will be significantly reduced. Just as carnivorous fishes should be offered a variety of different meaty foods to reduce the likelihood that some crucial nutrient will be overlooked, herbivorous fishes, such as many species of tangs, should be offered a wide variety of greens. I recommend alternating green, red, and brown varieties of dried marine algae (occasionally soaking the algae in a vitamin supplement before feeding) as well as adding to the menu a quality frozen herbivore preparation and various other foods specifically formulated for herbivorous species.*

Q *Astraea* Snails on Sand

I recently purchased a dozen *Astraea* snails for algae control in my reef tank, and I've noticed that if I accidentally knock one of them down onto the sand and it doesn't land upright, it will lie there upside down or on its side until I pick it up and replace it on the rocks. This strikes me as a strange limitation for a reef organism. How do these snails persist in nature if falling on sand is basically a death sentence for them?

Mitch Savona
Rochester, New York

A *You have to understand that* Astraea *spp. snails on sand are somewhat like the proverbial fish out of water. They just don't occur there naturally (okay, some fish do actually occur out of water, albeit temporarily… but I digress). In nature,* Astraea *snails spend their lives on hard substrates, never venturing across tracts of fine sand, so they lack the adaptation of righting themselves on fine-grained substrates. Efforts to do so in the aquarium usually result in the snail toppling back over with grains of sand still clenched in its "foot." If left trapped in this manner, the snail can easily fall victim to opportunistic predators, e.g., hermit crabs, or will eventually starve to death.*

Q Percula vs. Ocellaris Clownfish

Can you tell me how to tell percula clownfish and ocellaris clownfish apart? Someone told me there's a difference in the number of dorsal fin spines. I think there's

supposed to be nine spines on percula clowns and 10 on ocellaris clowns, but I find it almost impossible to count them. Is that the only difference between these two species?

Pete Ferguson
Akron, Ohio

A *Counting the number of dorsal spines isn't much help in distinguishing* Amphiprion percula *from* A. ocellaris *because the former can have either 9 or 10 spines while the latter can have either 10 or 11 spines. That means there's a possible overlap in the number of dorsal spines between these two species. Besides, as you note, it's no easy task counting the dorsal spines on a constantly wiggling clownfish in your local fish store. Supposedly, there's also a difference in each species' iris color, with the iris of* A. percula *being brighter orange and* A. ocellaris *being a more grayish orange, but if that's true, I've never been able to detect that subtle difference. I've always found that the best way to tell them apart is to look at the black edging around the white bands on the specimen. Both species exhibit this black margin, but it's much more pronounced on* A. percula.

Q Flame Angels Fighting

I recently introduced two flame angelfish to my 135-gallon fish-only-with-live-rock (FOWLR) aquarium, thinking the tank would be large enough that the two wouldn't fight. Boy was I mistaken! They've been fighting like cats and dogs ever since I put them together in the tank. Do you have any suggestions on how to establish a truce between these two?

Leslie Smead
via email

A *If my personal experiences with the flame angelfish* (Centropyge loricula) *are any guide, there's little you can do to encourage the peaceful coexistence of more than one specimen in the average home aquarium—even in a relatively large system, such as your 135-gallon. For their size, flame angels (in common with many* Centropyge *species) display a lot of territorial aggression—especially toward conspecifics, congeners, and other species that are similar in size, color, shape, or habits.*

One thing you might want to try before throwing in the towel is to arrange the rockwork in the tank to create two distinct reef-like outcroppings—one at each end of the tank and each with ample hiding places. That way, each flame angel could claim one of the rock piles for its own territory, thereby (theoretically) minimizing the need for territorial squabbling. However, if both specimens decide to claim the same rock pile, they'll be right back at each other's throat, so there's no guarantee this technique will work. If this doesn't do the trick, your best option is to either move one specimen to another tank or return it to your dealer.

Q Bad Luck with *Blastomussa*

What is the trick to keeping *Blastomussa* corals alive? I've tried keeping *B. wellsi* on several occasions,

Tyler Fox/Shutterstock

■ The ideal setup for *Blastomussa* corals would include moderate lighting and relatively gentle water movement.

but each time, the specimen's tissue receded and it eventually died. I don't know why I have such bad luck with *Blastomussa* since I usually have no problem keeping stony corals. My *Acropora* corals have been thriving for years, and *Blastomussa* is supposed to be easier to keep.

Tara Campbell
Washington, D.C.

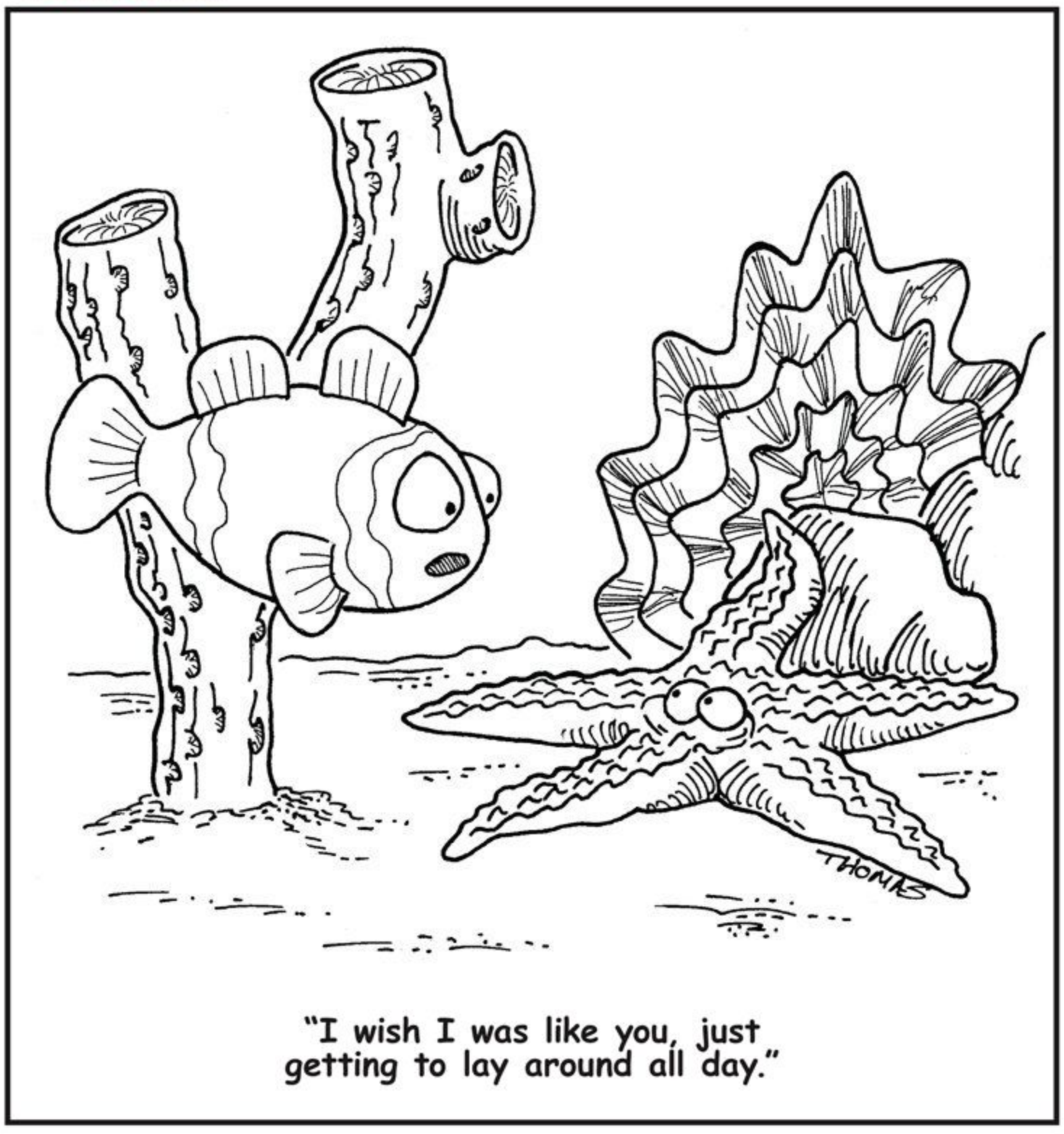
A *Assuming you've attempted to keep* B. wellsi *in the same system that houses your* Acropora *corals, the problem could be that you're trying to fit the proverbial square peg in a round hole. Remember, corals have evolved to fill a wide range of ecological niches, which means their requirements with respect to lighting and water movement can vary markedly. The conditions that are generally considered favorable for* Acropora *spp. corals—i.e., highly intense lighting and powerful water movement—aren't really appropriate for* Blastomussa *spp. corals, which prefer moderate lighting and relatively gentle water movement. I think you'd find that these corals actually are fairly easy to keep alive and thrive given the proper environmental conditions.*

Q Husband Hand-Feeding Moray

Can you please help me convince my husband that he shouldn't be hand-feeding our chestnut moray? He insists that the eel is too tame to bite. I keep telling him it's just a matter of time before I'm taking him to the emergency room for stitches.

Sheila Stelzer
via email

A *Well, being a husband who does more than his fair share of inexplicably silly things (such as going outside and looking up at the sky during a thunderstorm), I'm not sure anything I say will make a difference to your husband. Still, you might try pointing out to him that, while your chestnut moray (presumably* Enchelycore carychroa*) probably won't try to bite the hand that feeds it out of aggression, it might do so purely by accident. Moray eels have notoriously bad eyesight, and they tend to get rather excited and boisterous when the scent of food is in the water. That's a really dangerous combination when you're putting your hand close to the business end of the eel. Also, encouraging the eel to associate a hand entering the water with the delivery of food could prompt it to bite when your husband or someone else has to put a*



Nuno Vasco Rodrigues/Shutterstock

■ Yellow-headed sleeper goby (*Valenciennea strigata*); be wary of the sand-sifting behavior of some gobies, which will cloud water and irritate certain corals.

hand in the water for reasons other than feeding, such as cleaning, rearranging rockwork, etc. You might want to give your husband the gift of a feeding stick and encourage him to begin feeding the moray with it. That way, he can still enjoy feeding it directly while keeping all of his fingers intact.

Q Falco's Hawkfish Novice Friendly?

I'm starting my first saltwater aquarium, a 40-gallon, and I would appreciate your opinion on a beginner keeping Falco's hawkfish. Do you think this fish would be a good choice for my first tank?

Pat Andrus
via email

A *I'd say Falco's hawkfish* (Cirrhitichthys falco) *is a superb choice for a novice hobbyist. This species is extremely hardy, stays reasonably small, readily eats just about anything, and is just plain neat looking with its rusty red stripes and spots and neat, frilly filaments (called cirri) extending from each dorsal spine.* C. falco *has graced several of my aquaria over the years, and I've always found it to be a very gratifying species to keep. It can be a bit of a bully, however, so you do have to choose its tankmates with that in mind. Order of introduction can make a big difference in this regard, as well. You'll want to be sure to introduce* C. falco *after more passive species to minimize territorial aggression. Also, avoid keeping any fish or crustaceans that are small enough for the hawkfish to swallow. Apart from those considerations, the only other potential issue I can think of is jumping.* C. falco, *in common with most hawkfish, is prone to leaping out of aquariums. In fact, I almost lost one specimen this way myself (fortunately, I was on hand to return the little leaper to water before any real harm was done). So, be sure to keep your tank completely covered, especially during the settling-in stage while the specimen is getting accustomed to its new home and tankmates.*

Q Sleeper Goby and Brain Coral

I have a yellow-headed sleeper goby in my 75-gallon reef tank to help keep the deep sand bed stirred. I think it's doing its job too well because its sand-sifting behavior sometimes actually clouds the water temporarily. This doesn't seem to be bothering any of my corals except one. My *Trachyphyllia geoffroyi*, which is the only coral positioned on the substrate, has been frequently, for lack of a better term, overinflating itself, forming a dome with its tissues. I assume this is a reaction to the goby's sandstorm because I'd never seen the coral do this before now. Will the sand settling on the coral eventually affect its health?

Angela DeHoff
via email

A *T. geoffroyi will expand in this manner to eliminate sediment that has settled on its tissues, so I think you're correct in assuming that this overinflating behavior is connected to the yellow-headed sleeper goby's* (Valenciennea strigata) *sand-sifting activity. Will the coral's health be affected? I'd say, depending on how often and how severely it's exposed to these sandstorms, there's a good chance its health will eventually suffer. Eric Borneman, in* Aquarium Corals: Selection, Husbandry, and Natural History *(TFH Publications, 2001), seems to confirm this when he states, specifically in reference to* Trachyphyllia *species, "Corals must expend energy to remove accumulations of sediment and sand from their surfaces, and captive specimens can become weakened if they must constantly cope with aquarium substrate or debris covering them. Certain fishes, such as substrate-sifting gobies (e.g.,* Valenciennea *species) may not be welcome additions in aquariums housing* Trachyphyllia."

It might be possible to give your brain coral some protection by arranging rockwork in such a manner that the coral is walled off from the goby and its digging and by directing water flow such that it prevents sand from settling on its tissues, but, then again, it might come down to re-homing one specimen or the other.

ask jack

Dear Jack,

In my 75-gallon tank, I keep 12 small discus along with a school of cardinal tetras, as well as 10 *Corydoras* catfish. I feed my discus and cardinals a formula you made about 10 years ago. The larger pieces are quickly eaten by the discus while the smaller pieces are eaten by the tetras. I am assuming the cories are eating what food falls to the tank bottom. The tank temperature is always 84°F.

My problem is that I am very much interested in my discus and cardinals but am tired of the catfish. Is there another bottom-feeding fish I can obtain to replace the catfish?

Sandra Colson
Jacksonville, Florida

Dear Sandra,

You mention that you want to say goodbye to catfish and get another type of bottom-feeding fish. This is a first-time question for me. If you had said you wanted a quality bottom-feeding fish for a discus tank, I would have quickly suggested one of the many species of Corydoras. *Any of the popular members of the loach family are also so-called bottom feeders, but of the ones I know of, they are not really diurnal feeders.*

If there were an algae problem in your tank, I would suggest you obtain some Otocinclus *catfish, but I think you'll do better by staying with the* Corydoras. *Remember that there are many attractive, colorful* Corydoras *spp. I don't know what species you have, but how about trying* C. arcuatus, C. reticulatus, C. schwartzi, *or* C. rabauti? *One of these should certainly interest you sufficiently. Your discus tank temperature is 84°, so any species of* Corydoras *will do well. On one trip to an area of western Fonté Boa, Brazil, I found many little ponds—more or less isolated from the little streams. No discus in these ponds, but there were many* Corydoras. *The water temperature had to be close to 90°, and I saw the catfish popping up to the surface at all times. There are more than 60 recognized species of* Corydoras, *so you will have no problem in choosing a very nice one.*

Dear Jack,

For the past six years, I have known about the different colorful discus while having success with many other freshwater tropical fish. With space now available, I plan to obtain about 10 discus. How will I know or recognize whether or not the fish I plan to purchase are healthy?

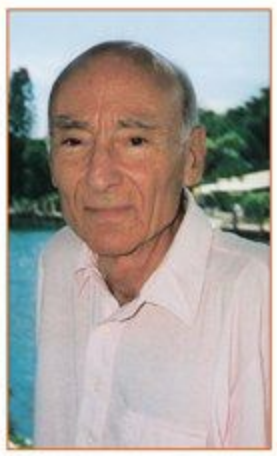
David Wolfensberger
Garden Grove, California

Dear David,

You have plenty of excellent discus breeders in California, so I have to assume you have taken steps to view the fish before you purchase them. If that is so, I would look at the breeders' operation—the young fry, growing 2- to 3-inch fish, plus adult-size fish.

Are they all active in a normal way, the correct size for their age, and have proper color? If so, go for it! If you can't see the discus before the purchase, you will

Jack Wattley is worldwide the most recognized name in discus breeding. Breeder, judge, collector, scholar, Jack is the foundation on which modern discus keeping has been built. He has been sharing his experience and knowledge—and the discus he breeds—with aquarists throughout the world for decades, and just one of his many awards was his recent Lifetime Achievement award from the ACA. Long past the age at which most people retire, he still serves as ambassador of discus and goodwill across the planet.



jack wattley

have to make the same observations upon receiving them. Look at some of the points I've given to other discus hobbyists here in these pages.

Dear Jack,

I have recently purchased a number of expensive discus and have had them in quarantine for the past two weeks. They are all eating well, and their color is very good. The water they were in at the dealer's shop had a pH of 7.6, and the water temperature was 80°.

Over this two-week period of quarantine, I slowly increased the water temperature to 84° and dropped the pH to 7.0. The discus took these changes very well, so at this point, I want to know if I can now consider these to be completely disease free and can move them into my discus collection without any unseen problem.

D.L. Josey
Sylmar, California

Dear D.L.,

Yes, I would consider your new fish to be disease free. Remember, though, I haven't seen them and haven't seen their normal rate of breathing before their having been fed. If that rate is approximately 60 to 70 times per minute, I'll assume the fish have no gill worms of either kind.

If you have a microscope, you might want to check some of the discus' fecal matter. The fish can look completely disease free but be carrying a minor number of internal parasites that, under excellent conditions, don't cause any health problems. However, if your fishkeeping methods should break down for whatever reason, those parasites will very quickly begin to cause big problems.

Dear Jack,

In the forest-like area near our property are many ants. I've never seen you write about ants as a live food for tropical fish. Have you ever fed ants to your discus? If so, what method would I use to collect the ants?

E.C. Pierre
Port Allen, Louisiana

Dear E.C.,

Yes, I have fed ants to my discus, but only while they were in the larval form. The ants in the larval stage are soft enough for discus to eat, but when they reach the metamorphosis of a full ant, they are too hard for any discus to digest because of the chitin that makes up their exoskeletons. Collect the ants while they are still soft and are still in the wood near your property. I generally cannot get enough ant or termite larvae to feed my small South American tropical frogs, but enough for the discus. And as a side note, the larvae are much more valuable for frog diets than for fish.

Gabriel Posada

■ Before purchasing any discus, make sure they are active, have proper color, and are correctly sized for their age.

Dear Jack,

Tropical fish hobbyists who have seen my discus have told me that the occasional scratching my discus do can be the result of some sort of parasite. Can you suggest any medication I might use at this time? Please let me know.

Obdulio Isarama
Balboa-Ancon, Panama

Dear Obdulio,

Having virtually no information to help you, I would first attempt to determine if there is indeed some kind of infection due to parasites. If you do not have a microscope and do not wish to obtain one, you might want to take your fish to Barro Colorado Island, which may require you to obtain a permit. I know you'll be able to find an agent of the Fish and Wildlife Department.

In the meantime, please obtain a microscope. Without a microscope, you won't be able to define many fish diseases. Microscopes aren't expensive, and it is not necessary to purchase a new one if you have something older. They don't wear out, and unless the microscope has been damaged, a 20-year-old microscope will operate as well as a new one.

Used microscopes can be found in pawn shops, as well as in many shops that have new ones. Also, look in the classifieds section of newspapers and websites.

*Parasitic problems will be very difficult to diagnose without a microscope as described here, but both protozoans and parasitic worms can be quickly seen under the correct power. It certainly gives any tropical fish hobbyist great satisfaction to know whether or not his fish have gill flukes, for example, and whether or not the flukes are the anthelmintics—*Dactylogyrus *or* Gyrodactylus. *Both forms are very easy to discern with most any inexpensive professional microscope.*

cichlid world

Unexpected Dambas

One of the advantages of having a *lot* of aquariums is the freedom they give you to pick up fish at the spur of the moment. One of the disadvantages of having a lot of aquariums is that one often loses all sense of restraint when going to auctions, totally overestimating the amount of space available back home. I am terrible at auctions, which is why I do not go to many. When I do go, I always manage to leave with a lot more fish than I intended to.

Two of the best cichlid auctions of the year take place at the annual American Cichlid Association (ACA) Convention (to be held this year in Indianapolis the second week of July). The Friday evening Babes' Auction features 100 or so bags of rare species donated to raise money for the association's research and conservation funds. The Sunday auction features a much larger variety of cichlids (and a great many more lots) and has been known to last late into the evening. Die-hard ACA auction buyers have learned that it is worth going home on Monday in order to be on hand at the end of the auction when the deals are really good.

The 2010 convention was held in Milwaukee, and for once, I thought that I would manage to make it away from the event without a single bag of fish. That was not necessarily my goal, but I chaired the event that year and spent all day Sunday on tasks outside of the auction room. Some really cool fish went across the auction block that year too.

Tearing down a large convention is best described as chaos, and in the process, some things get forgotten. During the last late-night inspection of the piles of products, equipment, and refuse, I discovered two bags of fish sitting behind an aquarium stand. The auction was long over, so I placed the bags in a cooler to take home. I did not even give the bags a critical look and doubt that I even took note of what the fish were.

A Rare Find

When I pulled the bags out a day later, I discovered that I was now the owner of six dambas. A damba is the general term for any of the Malagasy cichlid species in the genus *Paretroplus*. Most of them grow large, a few of them are very aggressive, some are even colorful, and all of them are considered to be at-risk species. These specific fish were all donated to the ACA by Laif DeMason (owner of Old World Exotic Fish in Homestead, Florida, publisher of *Cichlid News* magazine, and the first recipient of the ACA's Ross Socolof Award for his dedication to, among many other things, the preservation of Malagasy cichlids). The first thing I did was find a tank to keep the fish in, followed by writing a donation check to the ACA—those fish really should have been in the auction!

The dambas I now owned were two spotted damba (*P. maculatus*) and four Kiener's damba (*P. kieneri*), and I was not entirely sure what I was going to do with them. They are very nice fish, but they were not something that I would have gone out and purchased for my fishroom. I have very few tanks that will accommodate a group of full-grown dambas, and my interests are focused more on the western side of Africa. I put all six fish into my catch-all, 110-gallon display tank until I could decide what to do with them.

Ted Judy is an aquarist with over 25 years of fishkeeping and breeding experience. He is a generalist who enjoys all types of fish, from anabantids to tetras, and always finds plenty of space in his fishroom for species from West Africa—especially the dwarf cichlids. Ted has served on the Board of Trustees of the American Cichlid Association and is an active member of the Milwaukee Aquarium Society. Ted also maintains the websites www.tedsfishroom.com and www.forum.apistogramma.com.

ted judy

photographs by the author

The Genus *Paretroplus*

The genus *Paretroplus* contains 13 described species, which are mostly confined to northwestern lakes and rivers of the island of Madagascar. The genus can be roughly divided into two groups based on body shape, high bodied and low bodied. All of the species are laterally compressed, have small faces relative to their body size, and have small mouths. The dorsal and anal fins are not very tall compared to the overall height of the body and are rounded short of the caudal fin. The tail itself is crescent shaped (more or less, depending upon species). Overall, these cichlids look more like a marine surgeonfish than they do a typical cichlid, and they are more closely related to the Asian cichlids of the genus *Etroplus* than they are to any genus found on the mainland of Africa.

The high-bodied species are tall, very round, and tend to grow larger than the low-bodied species. The larger, high-bodied species that are most common in the hobby are *P. menarambo* and *P. maculatus*. Both species can grow to 12 inches or larger and require 100-gallon or larger aquariums. They can be very aggressive toward each other as well, so if keeping a group is going to be attempted, even more space is a good idea.

The most common smaller, low-bodied species in the hobby are *P. lamenabe* and *P. kieneri*. *P. lamenabe* is a beautiful orange fish that has the reputation of being very aggressive (and therefore needs adequate space). *P. kieneri* is a bit of an anomaly in the genus. Not only is it small, it is not very aggressive, and a group can be successfully maintained in a 55-gallon aquarium.

■ Kiener's damba (*Paretroplus kieneri*); the *Paretroplus* genus contains 13 described species that are divided into two groups based on body shape.

■ *P. kieneri* is unusual for the genus in that it is both small and unaggressive.

The Best of Both Worlds

I ended up with the best of both types: two of the larger, aggressive and colorful *P. maculates*, and four of the smaller, peaceful and not-so-colorful *P. kieneri*. The spotted damba grows up to be a very pretty fish, one of the most striking in the genus. Adults are an overall golden color with narrow red-orange lines running laterally along the body. The colors darken toward the edges of the body with some hints of sooty blue and purple. The most distinctive mark on the fish is the large, black, rectangular spot on the lateral line just behind the gill plate that gives the species its name.

Kiener's damba may not be as strikingly marked as the spotted damba, but careful observation will reveal that it is quite colorful and demurely pretty. At first glance, the smaller damba is an all-over mottled brown and gray, but a closer look reveals that, under the camouflage markings, there is a base color of bright orange red. That flash of color is most pronounced in the face of a female, though it is also present in the males. During periods of courtship, the orange red becomes more prominent, but it is never glaringly bright.

Keeping Kiener's Damba

The fish I brought home were all young, so they would be fine for the time being in the 110-gallon aquarium with its mix of smaller cichlids (*Cryptoheros* spp.), a few miscellaneous catfish, and a school of very active giant danios. I was concerned about the aggression of the *P. maculatus*, especially toward the smaller *P. kieneri*, but that turned out to be a non-issue. The dambas took a few weeks to settle in to their new home, and then one of the *P. maculatus* decided that it wanted to be the only one of its kind in the tank. The aggressor systematically persecuted the other spotted damba but left all of the other fish in the aquarium alone. In fact, it chose to school with the Kiener's dambas, which pretty much ignored the presence of the *P. maculatus* altogether. I removed the cichlid that was being harassed and eventually found homes for both of the spotted dambas. My original intention was to rehome all of them, but the *P. kieneri*

■ Kiener's damba will tolerate most water conditions that aren't soft and acidic.

had grown on me and I set my sights on encouraging them to spawn.

Once the challenges of space and aggression are met, providing a good environment for dambas is simple. Moderately hard water conditions are perfectly acceptable (pH 7.4 to 8.0, GH 8+, KH 8+), and they will tolerate a wide range of conditions as long as the water does not dip down to soft and acidic. Water temperatures in the mid-70s are adequate. Most of the species are riverine, so some current is appreciated. Water cleanliness is important, however, and because dambas are large and messy cichlids, it is best to over filter the aquarium. Regular large water changes help to maintain good water quality.

Feeding dambas does not present much of a problem either; they are omnivorous in habit and are "anything will do—just feed us" cichlids. They are not piscivores, however, so live animal foods should be limited to invertebrates. Worms of any flavor and crushed snails are relished. Crustacean and mollusk meat (shrimp, krill, squid) are also good sources of animal protein. Plant matter is also an important part of the diet. A well-rounded cichlid pellet designed for omnivores with a need for some vegetation is a good staple food for everyday use.

A Highly Intelligent Cichlid

The behaviors of *P. kieneri* are what captured my interest enough to keep them around for a while. Cichlids are relatively intelligent fish, and when compared to other cichlids, I would place dambas in the top 10 percent of the field. They are not shy and do not hide, even when strangers approach the tank. On the contrary, any new creature that appeared before the glass would elicit a response of curiosity from the dambas, bringing them out to the front of the tank to investigate.

Kiener's dambas are not in the least territorial, so no time or energy is wasted chasing other fish around the tank. Most of the day is spent looking for food, and when it is not readily available, the small group will wander around trying to uncover food possibly hidden under the substrate. I assume that this behavior is their natural feeding strategy.

The fish will slowly, in a tight group, swim just over the surface of the sand, stopping every few inches to insert their face up to their eyes in the substrate and then shake their head back and forth. This creates a divot in the sand that the fish patiently observe for any signs of an uncovered morsel of food. A full day of surveying leaves the bottom of the aquarium looking like a waffle. A fun way to feed live blackworms to the cichlids is to use a turkey baster to inject the worms into the sand and then watch the group perform their search. The behavior is even more interesting when there is actually some prey to find!

A Breeding Challenge

Another reason I chose to keep these unexpected dambas was because the genus is not regarded as easy to spawn in captivity. Most successes have been achieved in ponds, but if there is a species of damba more likely to reproduce in an aquarium, it is *P. kieneri*. There are very few spawning reports to be found in literature or on the Internet, but what is available suggests that the Kiener's damba is an open substrate spawner or possibly a protected substrate spawner that will lay its eggs on a hard surface loosely protected by some overhead structure.

I prepared the aquarium for spawning the dambas by taking out all of the fish that I thought would interfere with a pair's breeding (all of the other cichlids and catfish). I left the giant danios in the tank because they are good dithers and stay at the top of the tank. I also rearranged the structure in the tank to provide more spawning sites. I used a variety of flat stones, large flowerpots on their side, and slates lying under arching pieces of wood. I also picked up the frequency of water changes, added more animal protein to the damba's diet, and increased the temperature in the tank to 80°F.

The dambas responded with almost immediate displays of spawning behaviors. The females started to show a brighter red coloration in their faces. The males' overall color pattern darkened. Two pairs formed pretty quickly, and each staked out a territory on opposite ends of the aquarium. The usual behaviors of searching for food were replaced by the pairs staring at each other and occasionally flaring their gills, but when food was provided, the mock hostility was set aside and all four fish would again come together to feed and search for food. Once hunger was satiated, the courtship behaviors would begin again.

And that lasted for months without any spawning. I twice noticed females with their egg tubes extended, and once I was pretty sure that I had missed a clutch of eggs while I was away for a weekend, but in the end, my desire to have *P. kieneri* breed for me went unfulfilled. I kept at it for close to six months until a good friend asked if he could give the species a shot. Whatever I was doing was not successful, so I reluctantly let them go (with the agreement that I would get them back eventually). So far they have still not produced any fry.

Sometimes we find unexpected pleasure in a cichlid species that we did not intend to get, and my experience with dambas is a great example of that. There are others… find me at the Indianapolis ACA convention and ask me about the bag of baby *Uaru amphiacanthoides* a "friend" hid in my cooler when I was not looking. But that's another story…

life with livebearers

Live Foods for Livebearers: *Gammarus*

We raise many live foods in our hatchery. The live foods raised continuously include *Paramecium*, vinegar eels, microworms, *Moina*, *Daphnia*, *Gammarus*, mosquito larvae, *Tubifex*, and litter worms. *Paramecium*, vinegar eels, and microworms are too small to be useful as food for the relatively large livebearer fry, not to mention adults. Litter worms won't work either, since they are too large for most livebearers. That leaves *Moina*, *Daphnia*, *Gammarus*, mosquito larvae, and *Tubifex*, all of which are suitable for livebearers. All of these can be easily cultured. Since it's difficult to cover all five within the constraints of publishing, I'm going to write about the overall most useful and easiest to culture, *Gammarus*.

The Genus *Gammarus*

Gammarus, which are commonly known as scuds, are shrimp-like crustaceans or amphipods. *Gammarus* species live worldwide in a wide range of aquatic environments, from freshwater to full marine conditions. According to ITIS, there are 31 species in the genus *Gammarus*. Other sources claim from 72 to more than 250 species. One site, FOSSWeb, a resource for biology teachers, claims there are 50 American freshwater species alone. Who knows! The species are very difficult to discern.

Description

All *Gammarus* have a common characteristic, a laterally compressed body. Most are about 1 cm (0.4 inch) in length, with one species being only 0.5 cm (about 0.2 inch) and at least one species reaching 3 cm (just over an inch). *Gammarus* have a cephalothorax (head/thorax), seven thoracic segments (each with a pair of legs), a six-segmented abdomen, and a tail. The first three pairs of legs are used for swimming, and the rear pairs are used for walking. Their heads sport two eyes and two pairs of antennae.

Behavior

In nature, *Gammarus* are nocturnal, being more active at night than during the day. While *Gammarus* swim, often on their sides or even backs, they typically crawl along rocks, sticks, and stems. They usually remain close to the bottom among submerged objects or other cover where they feel safe from predators.

Reproduction

In general, *Gammarus* breed during spring, summer, and fall when water temperatures are relatively high. While mating, a male carries the female about on his back. A mating pair feeds and swims together until the female molts, sometimes for a week or more. The male releases the female while she sheds her old exoskeleton, and the two mate afterward. The female holds the fertilized eggs in a brood pouch between her legs, and they hatch after one to three weeks. The young remain in the pouch until their mother molts again in a week or two. The young grow rapidly and, under good conditions, can begin mating in less than a month.

Feeding

Gammarus are scavengers, or detritivores, that graze on decaying plants, algae, fungi, animals, and almost anything else. There is little they won't eat. Using their anterior legs, they continuously sweep up water and debris and extract anything edible flowing past.

Charles Clapsaddle began keeping fish at age 7, winning some goldfish at a carnival. Successfully spawning them, he was hooked on fish. Mastering goldfish, his attention turned to livebearers, locally collected mosquito fish (Gambusia affinis), and sailfin mollies (Poecilia latipinna). By junior high he graduated to fancy guppies. His fascination with livebearers continues. Although his commercial hatchery breeds many other fishes, the development of new livebearer strains and the improvement of existing strains occupy his best efforts. Charles speaks to aquarium clubs across the country on various hobby topics. He has a BSc in Zoology from The University of Texas at Austin.

charles clapsaddle

photographs by the author

Our *Gammarus*

We originally collected *Gammarus* in the late 1990s from Coleto Creek in South Texas near the current location of our farm. At the time, our hatchery was located in Santa Fe, New Mexico. I have no idea which species we collected, and it's probably not important to know. Most freshwater *Gammarus* are gray/green amphipods less than a ½ inch long, and they all look alike and can be raised the same way. We reared those original *Gammarus* in 55-gallon vats inside our greenhouse. They thrived and provided an excellent food for the rainbowfishes we were raising at that time. When we moved to Texas in the early part of this century (2000–2001), we brought along those *Gammarus*. Thinking the warmer Texas climate would be conducive to outdoor rearing, we put the *Gammarus* into 300-gallon vats outside. We hadn't counted on the myriad species of dragonflies and the voracious appetites of their nymphs. When we went to harvest *Gammarus*, we got a bumper crop of dragonfly nymphs, a great food for large cichlids but deadly to small fish. Unfortunately, no *Gammarus* survived the onslaught of the dragonflies. Since we live only miles from their source, Coleto Creek, I frequently thought about collecting some from the wild to start over, this time indoors. But I never got around to it.

Then, in December 2008, I visited Caitlin Gabor, PhD, at the Texas State University campus on the beautiful San Marcos River in central Texas. Gabor studies *Poecilia formosa*, an all-female species commonly known as the Amazon molly. While giving me Amazon mollies, she offered me some *Gammarus*. These *Gammarus* were indistinguishable, at least for me, from those I'd collected at Coleto Creek a decade ago. I accepted them.

Arriving home, I unceremoniously moved Gabor's *Gammarus* into a 55-gallon vat, added some hornwort (*Ceratophyllum demersum*), a floating plant, and forgot about them. A few weeks later, *Gammarus* began showing up in vats all across the greenhouse. Since we use a recirculating system and all the vats share a common recirculating water source, the *Gammarus* larvae (which are very tiny) had found their way through pumps and pipes to colonize many other vats. From my perspective, this was no problem. Adult livebearers eagerly eat *Gammarus* of all sizes, while fry and juveniles eat smaller ones. Low populations of *Gammarus* persisted in vats by finding refuge in the floating hornwort and the sinking guppy grass (*Najas guadalupensis*) in the vats. While this provided a continuous source of live food to the fish, I decided once again to actively culture the *Gammarus* in larger numbers.

Gammarus, shrimp-like crustaceans also known as amphipods, are one of the easiest and most useful live foods to culture.

A major benefit of *Gammarus* is that they will not foul aquarium water.

Culturing and Using *Gammarus*

Gammarus are an easy-to-culture live food. They thrive in aquarium-quality water. While able to tolerate temperatures as low as 32°F and as high as 95°, they prefer tropical aquarium temperatures ranging from 68° to 86°. The pH and water hardness are not important. Our pH ranges from 8.0 in the morning to 8.5 in the afternoon. Our water is high in calcium, and we can grow stalactites and stalagmites simply by letting water drip from a faucet. *Gammarus* do have relatively high oxygen requirements and should be provided adequate aeration. They eat most anything, but we've found that packing a lot of hornwort in the vat provides a good food source. They graze on the microscopic organisms growing on the hornwort and, when crowded and hungry, will actually eat the hornwort. Since we throw away 50 to 100 pounds of hornwort daily, giving them hornwort to eat costs us nothing and is a no-brainer.

Collecting *Gammarus* to feed to our fish is simple; a sweep of a standard aquarium net yields thousands. Alternatively, shaking a handful of hornwort over a bucket supplies similar quantities. Feeding them to fish is also simple; just shake some from a net or pour water filled with them into the vat. Any *Gammarus* not immediately consumed survive aquarium conditions indefinitely, so they can be fed in abundance without fear of water fouling (do not, however, feed too many without adequate aeration, since this organism will compete with fish for oxygen). Since they will eat plants if they don't have adequate amounts of other foods, I'd be reluctant to place them in a prize-winning planted tank.

Gammarus can be easily reared in vats or similar water containers outdoors provided they are given protection from predators like dragonfly nymphs.

Hobbyist Culturing

Hobbyists can culture *Gammarus* with relative ease. Any container that can hold water can be used. I've found plastic garbage cans make good inexpensive rearing tanks. The hobbyist could take a clean plastic trash can (rinsed a few times to remove manufacturing chemicals such as formaldehyde) and then follow these simple instructions:

1. Fill the container with aged aquarium water.

2. Place about 2 inches of dampened dried leaves into the container. Most tree leaves are good, but you should avoid oak leaves, which I've found to be too acidic. Dried mulberry leaves are excellent.

3. Aerate the water. Large bubbles are better than very fine bubbles, which can get under their carapaces and make them float and eventually die.

4. Keep the water near or above room temperature. *Gammarus* can survive winters outside in most of North America but reproduce best at 68° to 86°, so try to maintain that temperature range.

5. Add a starter culture of *Gammarus*—a few dozen will be enough.

6. The *Gammarus* will feed on the rotting leaves and microorganisms that grow on any surface. Periodically add more leaves. The hobbyist could use hornwort like we do.

7. Since *Gammarus* need surface area to feed on, provide adequate surface area by placing rolled-up plastic screening in the culture container. I prefer to use plastic-coated water-cooling pads, but those are impossible to get in South Texas where swamp coolers don't work. Another good choice is aquaculture netting, like those we use to make breeding cages.

8. Begin harvesting in four to six weeks when there will be enough *Gammarus*. Harvest by netting them with a fish net or by picking up the plastic screening or cooling pads and shaking over a bucket.

9. Keep an eye on the number that can be harvested daily or weekly without reducing the population. That is the amount you can harvest safely.

10. Periodic, partial water changes are very beneficial.

11. Cultures are long-lasting, and sub-culturing is necessary only when production declines, which if you maintain your culture properly is never. Nevertheless, it is wise to maintain a replicate culture in case of a disaster. We always keep multiple cultures; you never know when a pesky dragonfly will lay eggs and her rapacious offspring will decimate or eliminate your *Gammarus*.

Raising *Gammarus* is an easy, almost labor-free way to get your fish to reward you with more vibrant colors, longer lives, and more and healthier fry.

Well that does it for this month. Remember; send any questions or comments to me at goliadfish@goliadfarms.com. If I use your email, you'll see your name in print. This column was inspired by an email from David Prilook, who asked me to write about live foods for livebearers.

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adventures in aquascaping

Mr. Saltwater Tank's 235-Gallon Reef Challenge, Part 3

When we last left our build, my new tank was well on its way to completion. It was cycled, with stable ammonia, nitrite, and nitrate levels. And aesthetically, it was starting to come together, with rock and sand placed just how I like it.

Now, if I'd wanted to stare at water, sand, and rock, I was done. But that's not why I keep saltwater aquariums—and it's definitely not why you do, either. Empty tanks are *boring*. It was time to liven things up a bit.

Back to Basics

First, though, we should review the basics of my aquascape. I'm a fan of using a bit less rock than average in my tanks. Think of it as country living versus urban sprawl. Sure, there's something to be said for being in the middle of it all. But in my tanks, I prefer to give my livestock plenty of open space. It's just the aesthetic I prefer.

This particular 235-gallon tank sits against two walls of a room, so the overflow is in the back corner. Naturally, I wanted to build up rock in front of this, to cover it up as much as possible. To do so, I chose to put together a two-island look, with a pair of rock piles surrounded by negative space. The first is on the left side of the tank (looking at it from the front); the other is toward the right.

Both islands are built out of man-made rock, since I'm not a fan of live rock for both environmental and cost reasons. Still, I took care to give both as much of a natural feel as possible. I've never been one to go crazy with PVC build-outs, epoxy work, or foot-long cantilevers. Basically, I want something that looks like the ocean I dive in. So, basic it was—complete with plenty of caves, shelves, and overhangs.

The tank is lit by four of my favorite LED lighting units, with 34 LEDs (in five colors) apiece. I'm absolutely sold on LEDs over halides, thanks to their energy efficiency, full-spectrum output, and customizability. The best ones can communicate with each other wirelessly and replicate natural lighting conditions, right down to sunrises, sunsets, and thunderstorms. I have mine hung on two rail units, clustered over each of the two rock islands. I might add two more, but that would just be for fun; I haven't seen any poorly lit spots so far.

The two-island look is ideal for effective water flow too. As I mentioned in last month's edition, I installed three magnetically coupled, no-drill propeller pumps: a large master in the front left and two smaller units in the back. They communicate with each other wirelessly, such that one pump can be running at a high flow rate while the opposing pumps can be run at a lower flow rate. One reason I like these particular pumps is that they allow for a variety of flow modes, pushing detritus into the overflow and exposing corals to varying wave patterns—all with a minimal in-tank footprint. Seriously, don't skimp on your pumps. A pump is more than just something that pushes water around. They can directly impact the health of your tank and its inhabitants.

Stocking Up

As I said before, a tank without livestock is no fun. Immediately after cycling, all that my big, lonely tank contained was three blue-green chromis (*Chromis viridis*). As will happen with the species, three chromis became one chromis rather quickly. One fish becomes dominant and starts picking off the other fish. It's sad, but there was no avoiding it. Chromis are great swimmers,

Mark Callahan has loved (un-frozen) water since his childhood years in Tennessee. As a child, he spent eight months a year on a lake and traveled with his family to Maui each spring break. He learned to scuba dive there at the age of 12 and has been addicted to the ocean ever since. He owns and runs MrSaltwaterTank.com, the number one online resource for dedicated saltwater tank owners. He offers informative videos, articles, posts, and guides for marine and reef aquarium lovers.

mark callahan

photographs by the author

and you'll never catch one with a net in a tank with any kind of hiding place.

Down to a single fish, I decided it was time to up the biomass considerably. The fish from my old 90-gallon setup were still with a friend in my old hometown of Houston, so I went shopping online.

At first, I was tempted to pick up an Achilles tang (*Acanthurus achilles*). When I used to dive in Hawaii, I'd see them everywhere. They're beautiful, black and orange specimens. But they come with more than their share of baggage. They're ich magnets and consistently last fewer than three months in captivity. Many dealers won't even sell them anymore.

Ultimately, there would have been two outcomes to me buying an Achilles. First, it might have died—unfair to the fish, given the odds. Second, it might have lived, but my website, MrSaltWaterTank.com, gets plenty of traffic. I was afraid that my having success with an Achilles and broadcasting it to the Internet would result in many being purchased, with a lot of them not making it, which is again unfair to the fish.

In the end, I decided against the Achilles. They're better off in the ocean. Instead, I went with a whitecheek tang (*A. nigricans*), a far hardier member of the same family.

Along with the whitecheek, I added a trio of Maldives lyretail anthias (*Pseudanthias squamipinnis*), one male and two females. The final fish for this addition was a Midas blenny (*Ecsenius midas*), one of my personal favorites. They're easy to keep, don't add much to a tank's bioload, and look like eels when they swim. Plus, they tend to just hang out on rock outcroppings, watching the world go by. In my tank, they're the old dude who stares out his window at traffic wondering why everyone is in such a rush.

Now, conventional wisdom would advise against adding so much at once. It wasn't a problem in my situation. I had more than enough water volume, and I watched my water parameters carefully after the additions. There was no spike in ammonia, nitrite, or nitrate. I also waited a couple of weeks before adding more fish into the tank just to give extra time for my biofilter to catch up. A little extra safety net is always a good thing.

Stocking Up, Round 2

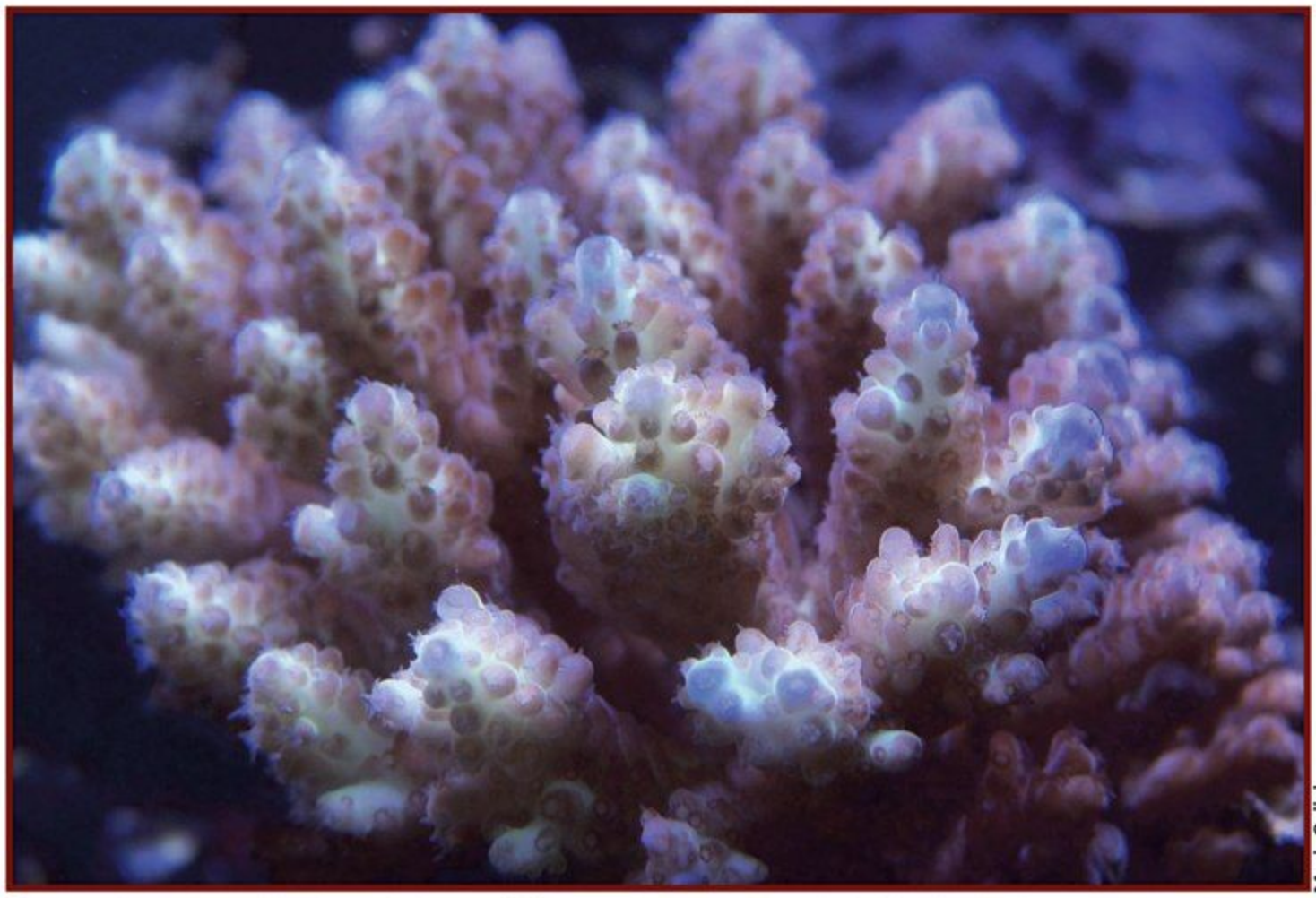
The next step was adding the fish from my old tank. I connected with my friend who was babysitting my fish, and the next day, a box full of them arrived at my doorstep. My favorite, a white-striped maroon clownfish (*Premnas biaculeatus*), made the trip, as did my purple tang (*Zebrasoma xanthurum*) and leopard wrasse (*Macropharyngodon meleagris*). Most importantly, my wife's favorite fish, a pink-spot shrimp goby (*Cryptocentrus leptocephalus*), arrived safely too.

With my old fish swimming happily in their new home, I turned my attention to coral. I went against conventional wisdom again here. Generally, it's not recommended to add small-polyped stony (SPS) corals to such a young environment. But I'd built this tank from scratch, with particular attention to detail. Why not try some? Ultimately, I added 18 pieces of "sensitive" coral to the tank. Sixteen survived—a pretty good rate, if you ask me.

Successfully introducing coral to a tank is part science and part art. For this build, I chose a mix of tabling and branching corals, paying particular attention to where they were placed. I don't like to stock tanks so full of coral that fish have nowhere to swim once the corals grow out. Likewise, putting tabling corals over light-sensitive pieces is a bad idea. Once they get bigger, they cast big shadows over other pieces and rob coral of light. It's all about varying growth patterns and thinking long term.

Mark Callahan

■ Some of the fish introduced were blue-green chromis.



Mark Callahan

■ A number of small-polyped stony (SPS) corals were also added to the tank.

Perfect No More

Every aquarist knows it: that punch-to-the-gut feeling of something being just a little bit *off*. Unfortunately, it hit me within a while of introducing my new corals.

I'd added a yellow belly regal blue tang (*Paracanthurus hepatus* var.) to my ecosystem, and he was not getting along with my whitecheek tang. The whitecheek chased the new tang around the tank almost constantly. When the yellow belly hid in the rocks, the whitecheek waited for him. To put it lightly, they didn't hit it off.

I separated the tangs for as long as I could and even tried to net them to separate them into different tanks—no dice. In the end, I woke up one morning to two dead fish. I'll never know exactly what happened—the autopsy that will reveal the age of the fish has not yet arrived—but, simply put, it was awful. Nobody likes losing fish, and I take it harder than most. I firmly believe that you have a responsibility to give your livestock the best possible conditions, and losing two at once (plus the chromis) was a blow to my two-year track record of losing no fish in my tanks.

Mark Callahan

■ LED lighting provides a gorgeous glow to the setup.

Worse yet, that wasn't all. Around the time I picked up my coral, I'd added a trio of Bartlett's anthias (*Pseudanthias bartlettorum*). They were fine for weeks until, one morning, they were just *gone*. All three died on the same night.

I was upset and more than a little curious. What could have caused it? Three fish gone, all in one night, with no sign that there had been an aggression issue or disease? I'd watched my nitrogenous waste levels closely and there had never been a spike, so I ruled that answer out. I used dry rock and dry sand, so the risk of pests carried in from the ocean was very, very low. At the moment, I'm concluding they were cyanide captures, but I'll never know for sure.

For better or worse, that's sometimes the reality of the hobby. You just never know for sure. Your fish can look healthy one day and be gone the next. It's frustrating, and it's more than a little sad. In the end, all you can do is provide the best habitat possible and keep it maintained. But some things you can't control.

Hiccups aside, the good news is that the rest of my livestock seemed healthy. After the anthias, I didn't experience another die-off. Thanks in large part to my lights and pumps, my coral adapted well to its new environment. After months of work, I was finally getting there—my new build was, at long last, a tank I could truly be proud of.

Of course, things don't stay that way on their own. Check back next month for the final installment, where we'll discuss keeping things happy and healthy.

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A Look at the Big Wrasses

There are several hundred species of wrasses in the ocean, and at least a few dozen of these are popular in the hobby. Many are very colorful, hardy as a fish can be, and have interesting personalities. A lot of the species seen for sale have a common drawback, however: their potential size. Lots of wrasses we see for sale as juveniles can grow to around a foot in length, and some can grow much larger than that. So don't be too quick to snatch up a cool-looking wrasse without doing some homework first.

I'll be covering a few commonly offered wrasses that get rather large, but it's important to keep in mind that these are just a sampling of what is available. Like I said, do some research first and check out any wrasse's maximum reported length at FishBase.org. I did that for the following species, and I think you'll be surprised at just how big some of them can get. Of course, I've provided the maximum reported size here and anything you buy most likely won't get as large as the record holder. But these fish can still get quite big in many cases. If you expect to keep one long term, I'd keep even the smallest of the species in a tank of at least 75 gallons, with a 100-gallon tank being the ideal minimum.

The Spanish Hogfish

The Spanish hogfish (*Bodianus rufus*) is a good-looking species that hails from the western Atlantic, the Gulf of Mexico, and the Caribbean. Spanish hogs live in reef environments and feed on a variety of crustaceans, mollusks, and echinoderms in their natural habitat. Juveniles of the species act as cleaners, meaning they pick parasites off larger fishes. I've even seen one picking a huge barracuda's mouth clean, apparently with no worries about being gobbled up.

Many grow to around 11 inches, though some can reach a length of almost 16 inches. That means they should be kept in an appropriately sized tank with plenty of room for swimming about. They should be supplied with a variety of meaty foods, such as fish, shrimp, and clam. They also like flake foods and brine and mysid shrimp.

Because their natural diet includes a number of common invertebrates, Spanish hogfish aren't really suitable for reef aquariums, and their size is also a strike against them. However, in a big-enough reef aquarium that lacks crabs and such, they might be okay, as they won't bother any of the corals.

For the most part, they'll get along fine with other similarly sized or larger fishes in an aquarium, with the exception of other hogfishes. So keep only one per tank, as they live solitary lives in the wild and are territorial by nature. Be aware that they may pick on smaller fishes and even eat really small fishes. You'll need to keep one with suitable tankmates if you want to keep everyone alive. You should also be sure to have plenty of rockwork so they have a place to take cover at night and get some rest.

James Fatherree, MSc has had more than a quarter century's experience with aquariums of all kinds and has been deeply involved in the reef hobby for more than a decade. His background includes diving, collecting, and photography, and he has worked in the trade on both retail and wholesale levels. With all this experience, he has seen his share of aquarium disasters, both natural and manmade, making invaluable his insights on how to save your tank during a crisis.

james fatherree

photographs by the author

■ Spanish hogfish (*Bodianus rufus*) should be kept only one to a tank, as they can be territorial and aggressive toward conspecifics.

The Cuban Hogfish

In terms of care requirements, the majority of what I said about the Spanish hogfish is essentially the same as that for the Cuban hogfish (*B. pulchellus*). Of course, they do look different, being bright red, yellow, and white, and they apparently aren't found in the Gulf of Mexico. They're also a good deal smaller, with a maximum size of almost 12 inches but having a common length of only 7 inches. Other than that, everything I said above applies to this species as well.

The Bird Wrasse

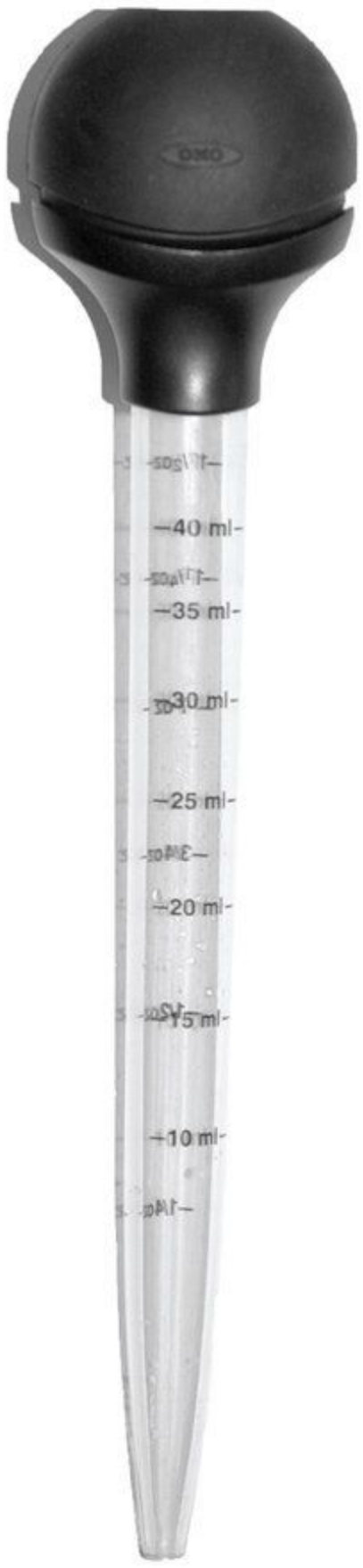
Unlike the hogfishes, the bird wrasse (*Gomphosus varius*) hails from the Indian Ocean and western Pacific. It does live around reefs, though, and feeds on crustaceans, mollusks, brittle stars, and small fishes. The males are green and commonly called green bird wrasses, but the females are white/cream on the front half and brown to black on the rear half. Don't get confused and think these are actually two different species.

They can reach a full size of almost 12 inches, so again, they'll need a big tank. They also need plenty of room to move around quickly and have been known to beat up their bird-like beaks on occasion by banging into the sides of undersized tanks. Like the hogfish, they won't bother corals, but they will certainly clear a tank of small motile critters and aren't suitable for most reef aquariums. They aren't aggressive for the most part, but they'll

■ Harlequin tuskfish (*Choerodon fasciatus*) have a unique set of blue teeth.

■ In addition to eating mollusks and crustaceans, the red coris wrasse (*Coris gaimard*) is also known to consume tunicates.

You Baster !



The lunare wrasse (*Thalassoma lunare*) gets its common name from the moon-shaped yellow crescent found on the tail of adults.

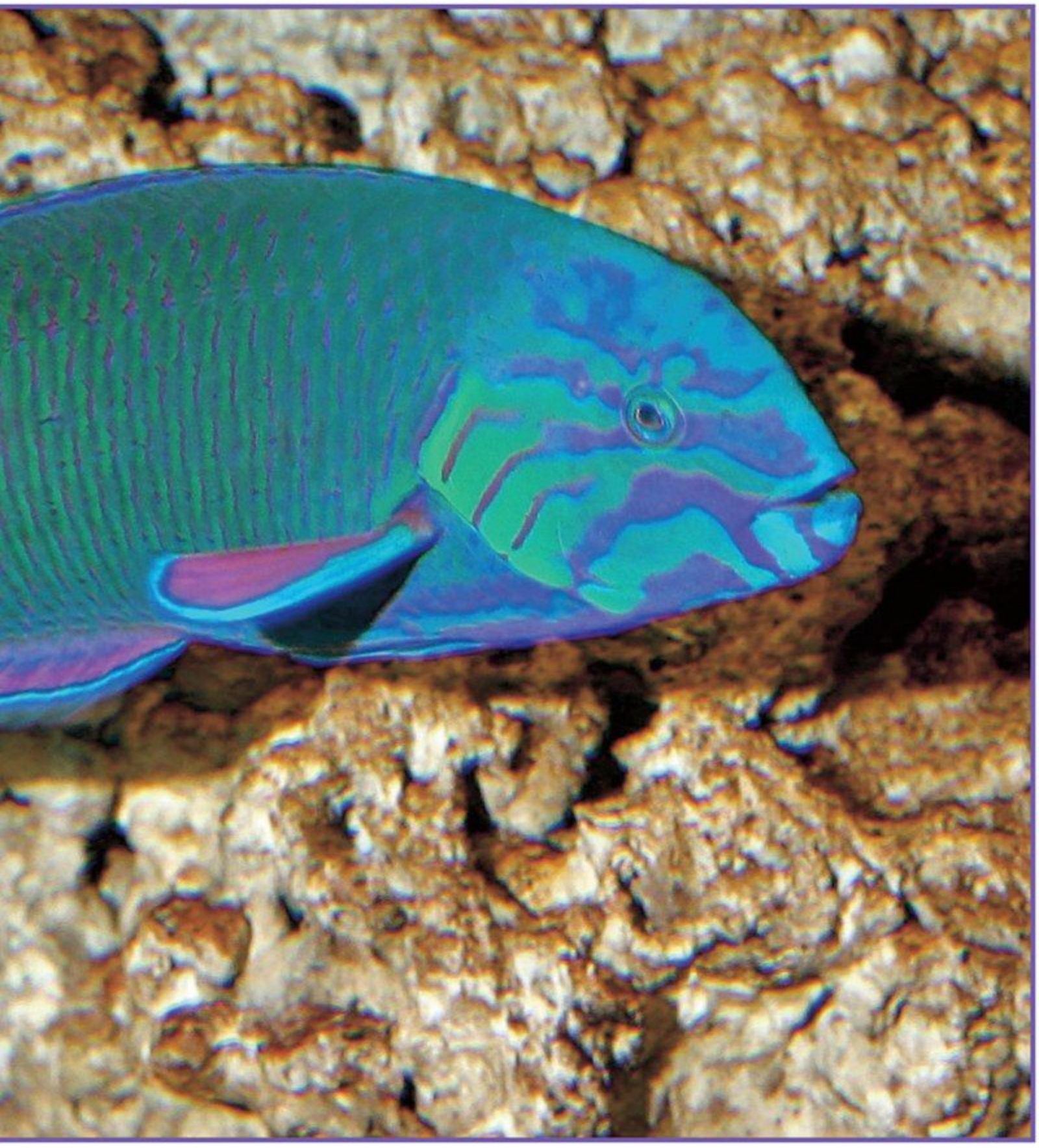
likely eat any fishes small enough to get in their mouths, which are surprisingly large. You can even keep more than one per tank as long as only one is a male. Pairs, and even one male with several females, have been successfully kept in one (very large) aquarium.

As mentioned, they should be given a varied diet that includes crustaceans and small fishes, and they'll need some hiding places as well. Some of them will also slip into a sandy substrate to sleep, so it's best to have a few inches of fine sand in an aquarium housing them. As you'll see, this is common for wrasses, many of which will dart into the sand and literally disappear in a flash when they choose to.

Lastly, I'll add that there's another bird wrasse that shows up in shops, though I don't recall seeing one in a long, long time. The blue, or Red Sea, bird wrasse (*G. caeruleus*) comes from the eastern Indian Ocean and the Red Sea. The males are dark blue, and the females are greenish blue on their top half and white to yellowish white on their lower half, so there's not much chance of getting these confused with *G. varius*. Regardless, other than appearances, these two species are essentially the same in every way, even reaching the same maximum size.

The Harlequin Tuskfish

The harlequin tuskfish (*Choerodon fasciatus*) also comes from reef areas in the western Pacific but apparently isn't found anywhere else. They can also reach a full size of almost 12 inches, and they also feed



on a variety of crustaceans, mollusks, and echinoderms, with worms added to the list. Once again, these are not well suited for life in reef aquariums either.

This is another species that lives a solitary and territorial life. So, one per tank is all you can have. These look mean for sure, with a mouth full of big teeth, but they're really just for show. A harlequin tuskfish may be aggressive toward much smaller fishes (especially those that are added after the tuskfish), but the species is typically easy going and oftentimes quite curious.

Other than that, they need the same diet as the other wrasses mentioned, as well as plenty of hiding places. But unlike the other species, these fish don't bury in the sand. Rockwork is required, but a deep sand bed is not.

The Lunare Wrasse

The lunare wrasse (*Thalassoma lunare*), which hails from the Red Sea, Indian Ocean, and western Pacific, is the largest of the wrasses I've mentioned so far. While most I see for sale are offered as juveniles measuring only 3 inches or so in length, this fish can reach a maximum length of almost 18 inches. Regardless, this is one of my favorite fishes when it comes to personality, and they typically get better and better looking as they grow. Note that their tail becomes bright yellow in the process, and adults are often called moon wrasses, as the yellow area takes on something of a crescent moon shape.

Other than that, they have the same diet as the above wrasses, feeding on a variety of invertebrates. They also have

the same space and feeding requirements. This is another of the species that slips into the substrate at night too, so you'll need a deep sand bed, and they'll also have to be kept one per tank. Also note that these (and many other big wrasses) will knock over items such as rocks and corals, so they're particularly poorly suited for reef aquarium life.

The Red Coris Wrasse

Being another species from the reef areas of the Indian Ocean and western Pacific, the red coris wrasse (*Coris gaimard*) is yet another spectacular-looking fish. It's a big one too, being able to reach a maximum size of almost 16 inches.

Like the others, it feeds mainly on mollusks and crustaceans, but it also eats tunicates. Its care requirements are the same as above. It also sleeps in the substrate, so a sand bed should be provided, and they should be kept one to a tank.

The Queen Coris

The queen coris (*C. formosa*), coming from the Red Sea, Indian Ocean, and western Pacific, also feeds on crustaceans, mollusks, and echinoderms. So, its feeding requirements are the same as the others, and they also sleep in the substrate. Thus, they'll need a deep sand bed to stay happy.

They're also bad about knocking over smaller rocks and such in tanks, but at least they're relatively peaceful fish that will get along with most any others. The real issue is that this species can reach a maximum size of almost 24 inches! Like the others, it's an active fish that rapidly moves about, so this fish is suitable only for tanks that are much larger than what most of us have in our homes.

The Clown Coris

The clown coris (*C. aygula*) comes from the Red Sea, Indian Ocean, and western Pacific. This species also feeds primarily on crustaceans, mollusks, and echinoderms. They live solitary lives and should be kept one per tank—a huge one, at that. They also sleep in the substrate.

■ Reaching a maximum length of almost 4 feet, the clown coris (*Coris aygula*) gets too large for practically any home aquarium.

While I've seen many juveniles for sale that are up to a few inches in length and quite fancy looking, these just get worse and worse looking as they grow. Adults are almost completely dark green and have a big vertical white stripe up their midsection, and they get sort of a hump on their head too. And, drum roll please, they can reach a maximum length of almost 4 feet! This is certainly not what you'd expect from such a commonly seen and attractive juvenile fish.

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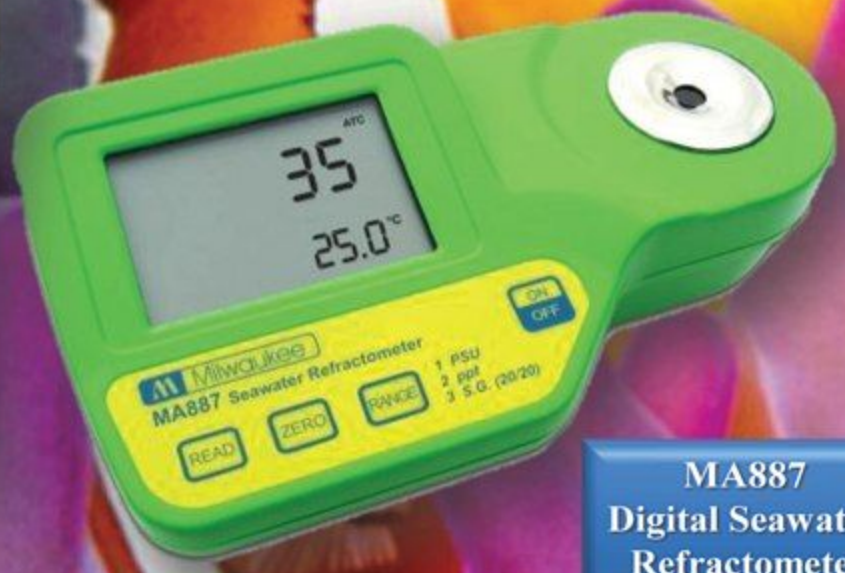

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■ A layout like this can be created easily using *wabi-kusa* without any growing difficulties.

An *Iwagumi* Layout Created with *Wabi-Kusa*

Takashi Amano

translated by Tomoko Schum

The use of aquatic plants is essential for creating a Nature Aquarium layout, and the planting density is important for the refinement of the finished layout. Stem plants and undergrowth plants must be planted with a relatively high density for an attractive appearance. The bushes of stem plants do not look attractive unless their stems and leaves become dense. The undergrowth does not appear attractive unless it grows densely enough to cover the substrate completely.

Planting at a High Density

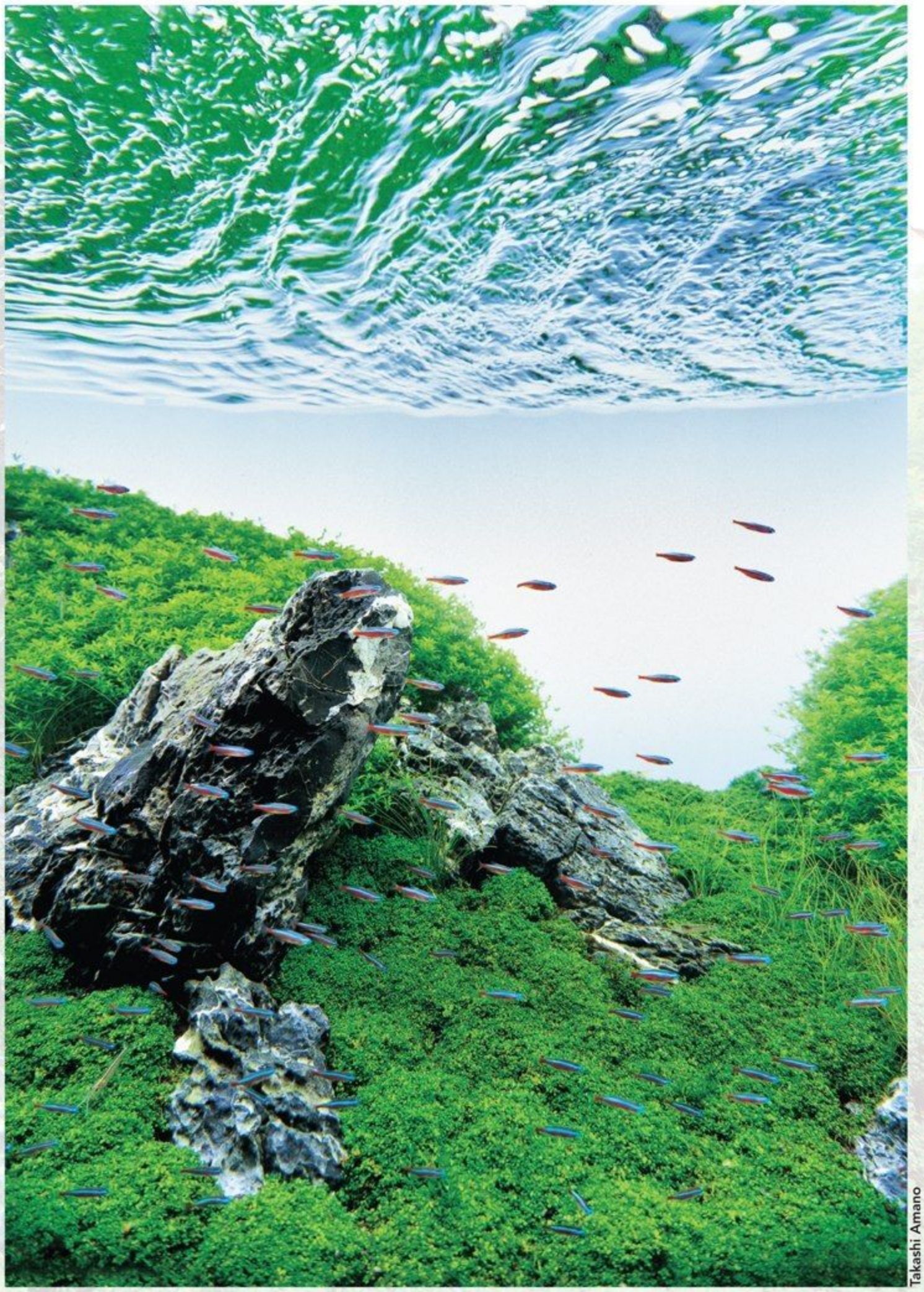
Planting aquatic plants at a high density from the start allows the plants to become dense in a short period of time and allows us to avoid an unsatisfactory result caused by a low plant density. Long ago, it was difficult to plant aquatic plants in high density. This was because aquatic plants were planted in the substrate by hand. I came up with the use of tweezers to overcome this difficulty. I was using commercially available tweezers initially. However, the tweezers were stiff and the tips did not come together accurately. They made it difficult to hold onto the fine stems of some stem plants and small undergrowth plants. Therefore, I developed tweezers specifically designed for aquatic plants. These tweezers are not as stiff, and the tips match up accurately so that delicate aquatic plants can be held gently with only a slight amount of force. The tweezers allowed the planting density to increase dramatically and made it easy to create a layout with polish. Additionally, the speed and efficiency of creating a layout increased by being able to select tweezers in sizes and shapes appropriate for the type of aquatic plants and the planting area.

Although aquatic plants are basically planted with tweezers, some areas of a layout are not easy to plant with tweezers. For example, it is difficult to plant in an area where driftwood branches are intertwined intricately, as this makes it difficult to move tweezers smoothly. *Wabi-kusa*—a ball of densely planted aquatic plants originally grown in terrestrial form—can be placed in such a location easily and allows you to create a complex layout that would be difficult to achieve with a pair of tweezers.

In addition, *wabi-kusa* can speed up the production of a layout regardless of its complexity. It enables the planting of stem plants and undergrowth in a much higher density and much shorter time than planting them with tweezers. Some *wabi-kusa* are planted with a mixture of various types of stem plants while some are planted with a single type of stem plant or an undergrowth plant. A layout can be created using only *wabi-kusa*, either by selecting one type or a combination of both types. A more complex layout can be created by adding aquatic plants other than *wabi-kusa* to the layout using tweezers. In this article, I am going to introduce an *iwagumi* layout that was planted with *wabi-kusa* primarily.

A *Wabi-Kusa Iwagumi*

The framework of this *iwagumi* layout was prepared by using *ryuoh* stones as a composition material and mounding soil high at the left and right rear of the aquarium. Such a steeply built slope is difficult to plant with tweezers because it

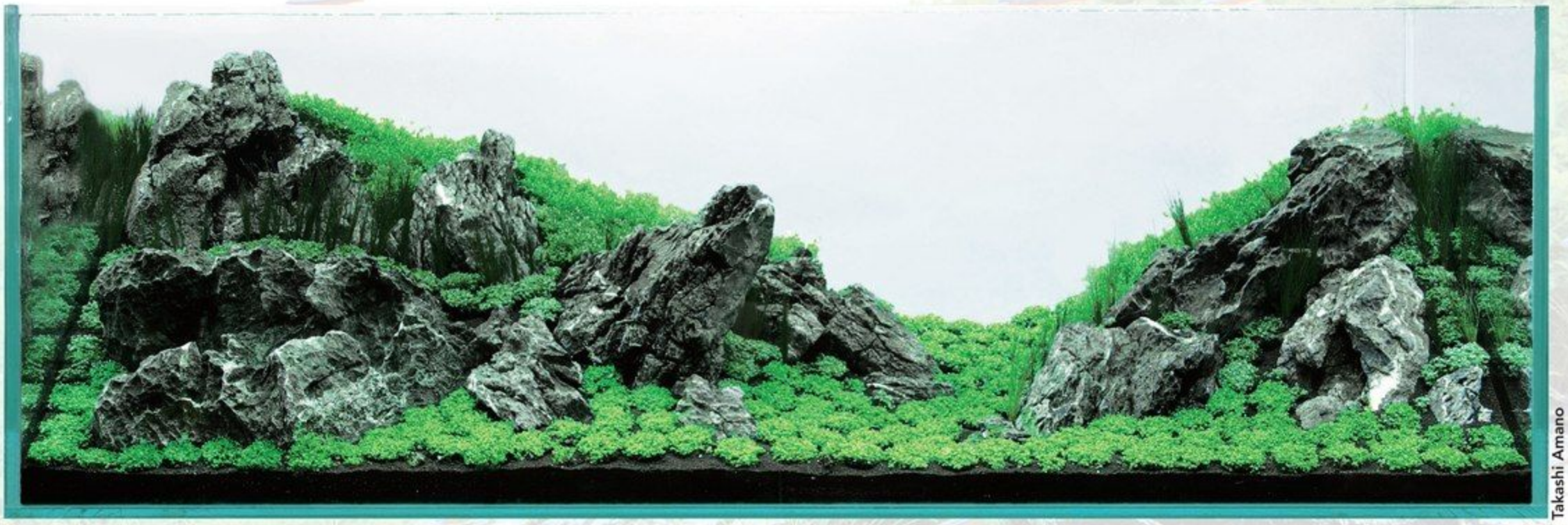


Takashi Amano

■ This layout was planted primarily with pearl grass and Cuba pearl grass. Hair grass was used as an accent.

Takashi Amano

■ A picture of the framework of the composition reveals that the substrate is mounded high with soil in the left and the right rear sections.



Takashi Amano

■ *Wabi-kusa* discs are laid over the slope to retain the soil on the slope.

DATA

Aquarium: Cube Garden W180 x D60 x H60 cm
Lighting: Grand Solar (NAG-150W-Green x 1, NA PC lamp 36W x 2) x 3 units, turned on for 10 hours per day
Filter: Super Jet Filter ES-2400 (Bio Rio L, NA Carbon)
Substrate: Aqua Soil Amazonia, Power Sand L, Bacter 100, Clear Super, Penac W/for Aquarium, Penac P, Tourmaline BC
Additives: Brighty K, Green Brighty STEP2
CO_2: Pollen Glass Beetle 50, 6 bubbles per second via CO_2 Beetle Counter (using Tower)
Aeration: For 14 hours after the light is turned off using Lily Pipe P-6
Water Change: ⅓ once a week
Water Quality: Temperature 25°C (77° F), pH 6.9, TH: 50 mg/l
Aquatic Plants (*Wabi-kusa*)**:** *Hemianthus micranthemoides, H. callitrichoides* "Cuba," *Eleocharis acicularis*
Fish/Invertebrates: *Paracheirodon axelrodi, Crossocheilus siamensis, Caridina japonica*

[Note: The hardware itemized above represents the author's specific choices; equivalent results may be obtained with other equipment and accessories—Eds.]

Takashi Amano

■ The side view of the aquarium shows that the steep slope is held down firmly by *wabi-kusa*.

tends to collapse easily during planting. Therefore, I retained the mounded soil of the slope by placing *wabi-kusa* on it in this layout. I used *wabi-kusa* with pearl grass for stem plants and those with Cuba pearl grass for undergrowth.

Since *wabi-kusa* has a round shape, it cannot be placed in some places as is, such as in a narrow gap between stones. For such areas, I used *wabi-kusa* by cutting it into halves or quarters. Although the small gaps between *wabi-kusa* will be filled as the plants grow, I used hair grass in the gaps between Cuba pearl grass. Doing so adds a variation to the undergrowth of Cuba pearl grass, which tends to be flat, and this enhances the natural feel. In the left and right rear sections of the layout where the substrate is mounded with soil, I placed *wabi-kusa* planted with pearl grass. Since the dense thicket of pearl grass looks more attractive, planting it in the form of *wabi-kusa* is best. When pearl grass is planted using tweezers, its stem sometimes becomes damaged in the process and melts away before taking root. On the other hand, *wabi-kusa* comes with emersed-grown pearl grass that is already rooted well and therefore rarely fails to grow in a layout. In this layout, the pearl grass grew into a nice bush in a short period of time through repeated trimming of submersed leaves that grew well underwater.

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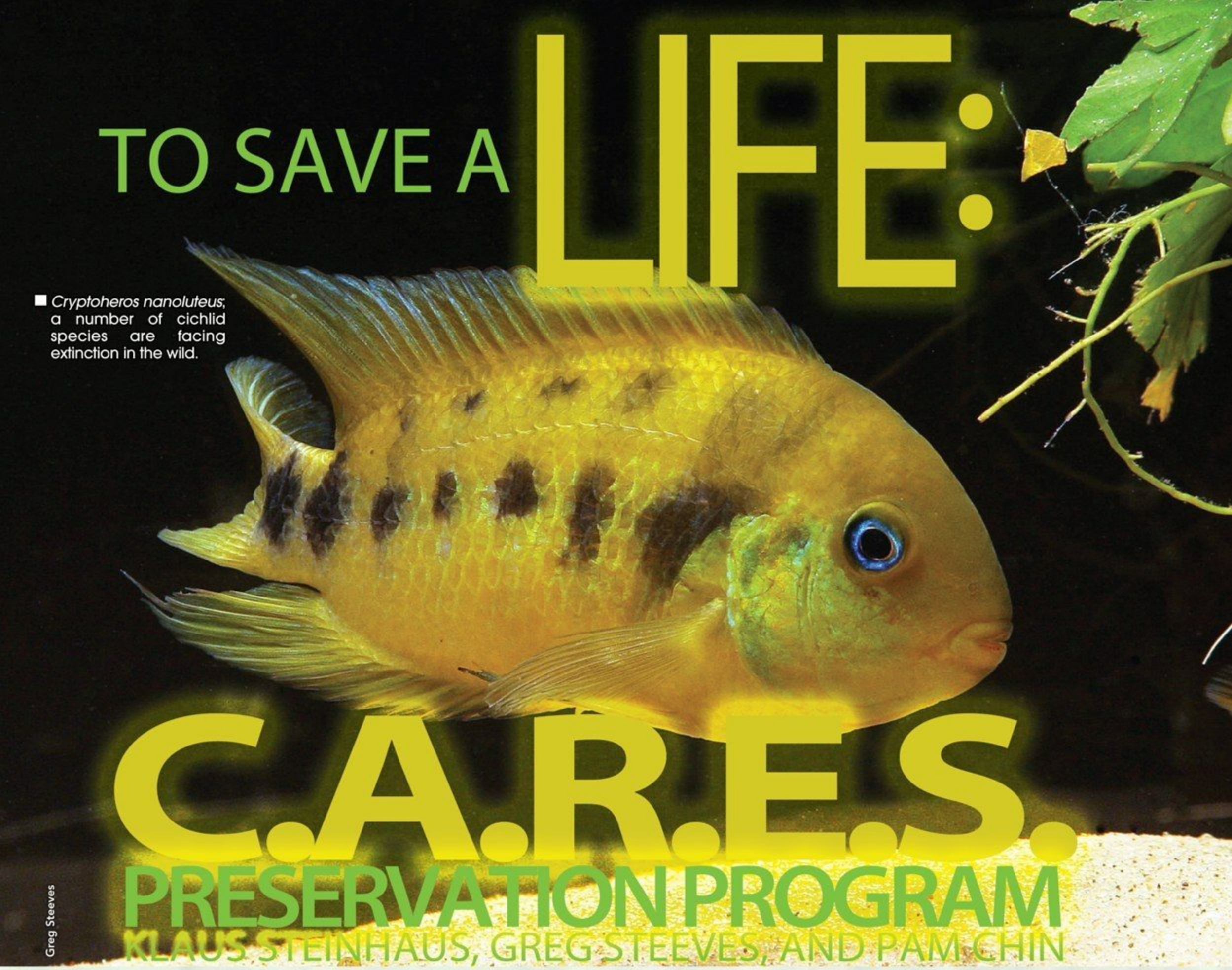

■ *Cryptoheros nanoluteus*; a number of cichlid species are facing extinction in the wild.

Greg Steeves

C.A.R.E.S. PRESERVATION PROGRAM

KLAUS STEINHAUS, GREG STEEVES, AND PAM CHIN

Freshwater habitats, and the fish therein, are in danger around the world. Overfishing, deforestation, pollution, invasive species, and a myriad of other sources all contribute to the destruction of these environments. Luckily, aquarists can help by keeping, breeding, and distributing those species that are at a particularly high risk. They can survive in our tanks even if they can't in their home countries.

The C.A.R.E.S. (Conservation, Awareness, Recognition and Responsibility, Encouragement and Education, and Support and Sharing) Preservation Program strives to build a base stock of a reliable source of at-risk species within the aquarium hobby. *Cryptoheros nanoluteus*, "*Haplochromis*" sp. "Kenya gold," and *Pseudotropheus saulosi* are three representative cichlid species that are at a particularly high risk of extinction in the near future.

Cryptoheros nanoluteus

Cryptoheros nanoluteus has been described as one of the prettiest small cichlids coming from Central America. It is found in the Guarumo and Pejebobo Rivers in Atlantic Panama. In the wild, *C. nanoluteus* resides under the overhang along the banks of small rivers with sandy bottoms. A generally peaceful cichlid, it is a delight to maintain in the aquarium, though it has been known to be aggressive with conspecifics. It is not terribly large, reaching about 4 inches in length. Females are easy to distinguish because they, unlike males, have a black spot in their dorsal fin with a gold-colored ring surrounding it.

At present, *C. nanoluteus* has a C.A.R.E.S. Classification of CVU, meaning it is vulnerable and facing a high risk of extinction in the wild in the medium-term future.

Aquarium Care

C. nanoluteus is recommended for hobbyists who have some past fishkeeping experience and consider themselves medium to advanced in skill. They can be sensitive to the deterioration of water quality and must be maintained on a strict water-changing regimen. Due to conspecific aggression, they also require a fairly large tank with a length of at least 4 feet.

C. nanoluteus prefers warm temperatures of between 76° and 80°F. It also likes neutral to slightly basic water with pH levels of 7.0 to 7.6. The filtration outtake

should be placed at one side of the tank to create a light current, which will imitate the conditions found in a small river. A sandy substrate with some small rocks, plants, and pieces of driftwood will be appreciated.

An omnivorous feeder, it will readily take pretty much any type of food offered. Include some kind of plant or vegetable matter, a necessary part of their diet, and make sure to feed sparingly, as they can easily gorge themselves when overfed.

If you want to keep *C. nanoluteus* as part of a community tank, the tankmates will need to be smaller and less aggressive.

Breeding

A substrate spawner, *C. nanoluteus* can be induced to breed when provided with fresh, clean water and a cave. The eggs will hatch in about 48 hours, and after another 30 to 48 hours, the fry will be free swimming. Both parents will look after the fry; the female stays close to her brood while the male protects the surrounding area.

"*Haplochromis*" sp. "Kenya Gold"

Many cichlid fishes from the Lake Victoria Basin in eastern Africa lack proper scientific description. Progress is slowly being made in cataloguing the many groupings on a genus and species level. In the meantime, the generic reference of "*Haplochromis*" is employed. In the case of "*Haplochromis*" sp. "Kenya gold," it is not yet certain which taxonomic grouping it conforms to. It has been suggested that this species might belong in a monotypic genus of its own. The field name refers to the golden body coloration as well as its country of origin.

Once quite common in the cichlid hobby, "*H.*" sp. "Kenya gold" was raised by Florida fish farmers, but in recent years, supplies have all but vanished. This Lake Victoria endemic has been given a C.A.R.E.S. Conservation Classification of CEN, which means it is endangered and faces a very high risk of extinction in the wild in the near future.

In its native habitat, "*H.*" sp. "Kenya gold" frequents soft-bottom areas in the vicinity of rocky outcroppings. Females brooding young are found in the shallows near shore in and around papyrus reeds. However, it has not been recorded at Mbiti Point in a number of years and the current status of wild populations is unknown. When it comes to captive breeding, due in large part to hobbyist networking through the C.A.R.E.S. program, a sound base stock has once again been established in the tanks of hobbyists and is reproducing in sustainable numbers.

Greg Steeves

■ *C. nanoluteus* requires substantial expertise to maintain, but its peaceful nature and moderate size make it a delight to keep.

Greg Steeves

■ "*Haplochromis*" sp. "Kenya gold" is similarly threatened by extinction.

Males and females have very similar body shapes but different coloration. Females have light tan bodies with clear fins (and possibly a single primitive egg spot on the anal fin), whereas the males have golden-yellow coloration on their flanks. Males also sport a red caudal fin and a yellow, blue, and red tint on the dorsal fin. They can exceed 4 inches in length, and males and females reach approximately the same size.

Aquarium Care

"*H.*" sp. "Kenya gold" is easily maintained as long as it is housed in a suitably sized aquarium of 60 gallons or greater and kept in a colony setting of 12 to 15 individuals of both sexes. The tank should include stacked rocks that provide caves and overhangs along the sides and back of the tank. A sandy substrate is necessary because this is a sand-sifting species. There should be a large open area above the sand to allow the cichlids to forage.

Unlike many of their cousins, "*H.*" sp. "Kenya gold" will not harm live plants, although they may uproot the plants if they are constructing a spawning pit. Therefore, it might be best to use only plants that do not root in the substrate. This fish also displays best in a species-only setup, although some of the smaller *Synodontis* catfish add a pleasing element of diversity to the aquarium.

Greg Steeves

■ Kenya golds are simple to keep and will flourish in colonies of 12 to 15 individuals.

Andrzej Zabawski

■ Though readily available in the hobby, the dwarf mbuna (*Pseudotropheus saulosi*) is endangered in its natural habitat of Lake Malawi.

These cichlids require a slightly alkaline pH of 7.6 to 8.0 and somewhat hard water with a KH of 10 to 23. Temperatures should be between 73° and 82°. They will accept most commercial foods, but since a large part of their natural diet consists of snails, they should receive an occasional feeding of protein-rich fare.

Breeding

A maternal mouthbrooder, the "*H.*" sp. "Kenya gold" female incubates a small brood of up to 20 fry for 18 to 22 days. She continues to protect her brood for another two weeks post release, and they are then left to fend for themselves. Aside from the preparation of the spawning pit and act of spawning, the male shares no parental duties.

Pseudotropheus saulosi

A colorful Lake Malawi mbuna, *Pseudotropheus saulosi* is a relatively small cichlid that does well in aquariums. It is indigenous to Taiwanee Reef, a large rock formation that is completely underwater. This rock structure is made up of a few massive boulders that are out in the middle of the lake and can be difficult to find even with a GPS. *P. saulosi* is found at a depth of about 45 feet, where it grazes on the algae growing on the boulders. While *P. saulosi* is readily available in the hobby, it is endangered in Lake Malawi. The habitat itself is quite small and isolated. Sadly, it has been overfished for the ornamental hobby and may soon no longer exist in the wild. Facing a very high risk of extinction in the wild in the near future, it has been given a C.A.R.E.S. Conservation classification of CEN.

One of the wonderful traits of *P. saulosi* is that males and females look so unlike one another that they appear to be different species. Males reach at least 3 inches in length and, when mature, display a striking combination of light blue with black bars. Females are slightly smaller at 2¾ inches and are a beautiful, solid yellow-orange color.

Aquarium Care

P. saulosi is fairly easy to maintain and breed if you keep them in groups and in larger aquariums of 55 gallons or more. They prefer water temperatures in the 76° to 78° range. They also require very hard, alkaline water with a pH of 7.8 to 8.5. Provide plenty of cover. Rocks or PVC pipes work well and ensure that any fish being harassed have a place to go as well as provide protection for holding females.

This colorful mbuna can be kept in Malawi community tanks, providing the tankmates are not too much larger. It is important that they be moved to a species-only tank for breeding to ensure that there is no possibility of crossing with other species.

P. saulosi is an herbivore that primarily scrapes and grazes algae, in which it also finds other bits and pieces of debris. It is fun to promote algae growth on your substrate and tank sides to observe this natural feeding behavior. Also be sure to provide green foods in the form of flakes or pellets.

Breeding

Like all mbuna from Lake Malawi, *P. saulosi* are easily bred harem style with many females and a few males. You will need at least a 55-gallon tank or larger. Groups of 12 to 18 are ideal; the more fish you have in your group, the harder it is for one to get singled out for aggression.

Given its endangered classification, if we want to ensure a future for *P. saulosi*, we need to maintain it in our tanks.

Make a Difference

By clearing a single tank in your home, you too can save a fish. It is because of individual hobbyists that the C.A.R.E.S. Preservation Program is making a difference. Let's all work together and preserve our fishes for generations to come.

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Paratheraps sp. "Coatza

■ Male *Paratheraps* sp. "Coatzacoalcos."

coalcos"

Mo Devlin

■ Male *P.* sp. "Coatzacoalcos"; these rare cichlids were labeled after their collection range in the Isthmus of Tehuantepec, Mexico.

■ Male *P.* sp. "Coatzacoalcos"; colors can vary greatly among these fish, with some taking on an intense blue.

Many of my Central American cichlids are wild caught. I either collected them myself or acquired them through friends. I've been very fortunate that my circle of acquaintances includes some well-known aquarists who have traveled the globe collecting and exploring. One such friend is Rusty Wessel. Rusty is well known to many in the hobby, and I have been fortunate to go on several collecting trips in his company. His knowledge and experience have made for many memorable adventures and stories. My acquisition of the very beautiful *Paratheraps* sp. "Coatzacoalcos" is one of them, but not one that originated in the field.

At the 2010 American Cichlid Association (ACA) Convention in Milwaukee, Wisconsin, Rusty said he brought along some "coatz" for my collection. I said, "Great. Let's go get them." As luck would have it, at that very moment, we were hit with a severe storm warning for a possible tornado. The alarm in the hotel was sounding, and everyone was headed for the storm shelter—except Rusty and me, that is. We were headed in the opposite direction, against the flow of traffic, back to his room where I was going to collect my fish. As we walked back and the storm raged, windows were rattling violently along the hallway. For a fleeting moment, I wondered if I would be swept up and sucked out a window only to be found a half mile away in a field with a bag of fish in my hand. It's the only fish I ever obtained in the midst of a tornado.

A Remote, Rare Cichlid

The name "Coatzacoalcos" refers to the range of species in the Coatzacoalcos River system in the Isthmus of Tehuantepec in Mexico. The fish has not been officially described. It is often confused with *P. zonatus*, another very beautiful blue fish, and mistakenly sold as "red-tail zonatus" due to the coloration in the caudal fin. In fact, many who think they have zonatus are likely to have one of the local variations of *P.* sp. "Coatzacoalcos."

The species in my tank is a variant collected in the Rio Carolina. This river is quite isolated and somewhat remote from the larger populations that exist in most of Mexico. Also inhabiting the Rio Carolina are *Vieja regani*, *Paraneetroplus bulleri*, *Thorichthys* sp. "mixteco," and *T. callolepis.*

As you would imagine, various collection locales will produce similar species of fish with a variety of color differences. Coatzacoalcos is

no different, even within siblings from the same area. As my fish matured, I noted that one in particular was much larger and had more blue color that was more intense than the others. I automatically assumed that it was a male and the rest were female. I later found out that I actually had two or three other males. Interestingly, while these were more colorful than the normally drab females, they did not present the overall striking blue of the initial male. After inquiring with some other aquarists online, I discovered that it wasn't unusual to have one or two fish with dramatically different coloration. Perhaps it is a dominance indicator. I don't know for sure. The female fish, while not as colorful, still present very interesting patterns.

Spawning *Paratheraps* sp. "Coatzacoalcos"

Spawning pairs in the wild generally have a bright yellow coloration. Unfortunately, this has not happened in my aquariums. From what I have gathered through other people's experiences, this is not uncommon. Like most of the Central American cichlids, breeding brings out not only the color but the behaviors that make keeping and photographing them interesting and fun. The coatz were no exception, offering a dramatic switch from solids to strong vertical barring on a high-contrasting background.

One thing you can always count on with Central American cichlids is that their aggression is always there and never more visible than during the breeding process. When Rusty gave me the fish, the one piece of advice he imparted was that "when these fish pair, you have to separate the pair because they will kill the other fish in the tank." And he was spot on. I had separated the dozen fish I had into three separate 125-gallon tanks. Shortly after the fish reached a length of 4 inches, a pair formed in one of the tanks. As these things often do, it happened when I wasn't in front of the tank. The result was a tank that went from a population of four to two—a male and female. After a few successful spawnings while they were juveniles, the male turned on the female. Now the tank had a population of one.

I'm very familiar with large aggressive fish and the challenges that come with breeding. Several years ago, I designed a very good divider for protecting breeding fish from mutual aggression. Under normal circumstances, I would keep the tank divided and allow a passage for the female to access the male's side. Because there is little difference in the size between the male and female in one of my other tanks right now, I opted for the next best thing. Even though the pair bred once or twice successfully while much younger, I thought it necessary to install a complete divider just to be safe. The female immediately started cleaning a breeding area in an upturned pot next to the divider. The male remained attentive. As has happened many times in the past, the pair will have no problem breeding through the divider.

■ Juvenile female *P.* sp. "Coatzacoalcos"; coloration and behavior will typically amplify during breeding.

■ Male (bottom) and female (top) pair of *P.* sp. "Coatzacoalcos"; pairs that form should be isolated, as they will likely turn aggressive toward other fishes in the vicinity.

One of my long-standing rules in the fishroom is that if the fish aren't breeding or posing for the camera, they're moved out of their home for fish that will. These lovely *Paratheraps* sp. "Coatzacoalcos" never fail to provide me with plenty of quality photos and lots of fry for distribution in the hobby. If you would like to see more photos of this fish, you can visit my gallery at http://goo.gl/LMYFE or visit the Aquamojo Facebook page. As always, if you have any questions or comments, you can email me at aquamojo@modevlin.com. Enjoy the hobby!

Myaka myaka:

Troy Veltrop

Imagine walking into your fishroom, peering into the tank that holds your most prized cichlids, and finding them missing—vanished, without a trace, taking along with them any means to replenish their stock. Sadly, this may be the case for the wild populations of many cichlids, even in our own lifetimes. The only difference is that we are being shown the warning signs now and it will come as no surprise when it happens. They will not have simply vanished; we will have allowed them to vanish unless we do something now. Each year, more and more species are being listed as critically endangered in their native habitats. Populations of some species, common just 20 years ago, have been reported to be nearly absent from their wild habitats today. Other habitats are home to species that teeter on the edge of being here today and gone tomorrow.

Far away in western Cameroon, nestled in the crater of an ancient, exploded volcano, lies one such habitat, Lake Barombi-Mbo, which is home to an amazing, and critically endangered, group of cichlids. The 11 species found in the lake, through the process of sympatric speciation, have evolved from one riverine species: *Sarotherodon galilaeus*. In this relatively small lake, with a total surface area of just 1,025 acres, all 11 cichlids have found their niche.

This is amazing to biologists because it has happened in such a confined area. Although the lake is very deep at 364 feet, only the first 131 feet of depth contain high-enough oxygen levels to allow the fish to live, leaving even fewer habitable niches. Some species, such as *Konia dikume*, have developed the ability to survive deep in the lake, where the oxygen levels are low. Others, such as *Pungu maclareni*, have found their niche by developing highly specialized feeding habits and dine on endemic freshwater sponges. One of my favorites, *Myaka myaka*, takes to the open water for most of the season, feeding on phytoplankton and insects, but moves to the shallows for breeding.

Condition Critical

A common thread among them is that they share an at-risk environment and have a desperate need for sanctuary in your aquarium. Although listed as a protected site, many of the species in the lake are still listed as critically endangered. As recently as 2007, the lake has released carbon dioxide from its depths, killing many deepwater fishes. Many were found floating on the surface in the middle of the lake.

Also, in 2001, many deepwater species were found dead on the surface and the lake water turned from a greenish blue to brown. The native Barombi people call this event "nkum." It is reported as happening every seven to fifteen years.

Between deforestation, possible introduction of nonnative species, overfishing, water extraction to supply the town of Kumba, and the possibility of the lake again releasing deadly carbon dioxide gas, the cichlids' future looks bleak to me. Bleak without your help, that is,

Here Today, Gone Tomorrow

Troy Vettrop

■ The author encourages hobbyists to try their hand at keeping and breeding *Myaka myaka*, a critically endangered cichlid species.

so I make a plea
on behalf of all the cichlids
of Lake Barombi-Mbo, for you to champion
them in their fight for survival by participating in programs
such as the C.A.R.E.S. (Conservation, Awareness, Recognition, Encouragement, and Support) Preservation Program. Choose a species, set up a tank, and join the fight to preserve Lake Barombi-Mbo's at-risk fishes for future generations. I currently house six different species from the lake, but today my C.A.R.E.S. banner flies for *M. myaka*.

Why *Myaka myaka*?

A male *M. myaka* is jet black, blue steel, and chrome; fast as a bullet and corners on a dime; tough as nails yet visually soft as velvet; and chaos wrapped in a black-and-chrome chassis. These are phrases more suited to a sports car instead of a fish, but this is precisely how I'd sum up *M. myaka*. It is possibly the coolest, and definitely one of the most colorful, of all the Lake Barombi-Mbo cichlids available in the hobby.

If you are looking
for a unique, rare, and critically
endangered fish, look no further than *M. myaka*.
Listed as critically endangered on the C.A.R.E.S. Preservation Program Conservation Priority Species at Risk List, this open-water species, sometimes called the featherfin of Lake Barombi-Mbo, needs a place in your aquarium. Give it only that, and *M. myaka* will surely find a place in your heart with its stunning beauty.

Starting just behind the gill plate, dominant males are shrouded in black as dark as a starless night. It's a velvety black that covers everything from that point backward to the caudal fin, except for a narrow edging of grayish silver that runs about 75 percent of the length of the dorsal fin. The gill plates are a flash of silver and white that melts

Troy Veltrop

■ Male *M. myaka*.

Troy Veltrop

■ The myaka cichlid is one of the most interesting species hailing from Lake Barombi-Mbo.

into a cap of bluish gray that turns a very vibrant blue when the fish is sexually active. Golden rings encase piercing black pupils, creating large eyes that jump out at you in stark contrast to the blue head and dark body. The outstanding coloring of the male fades to a dark grayish blue as its dominance level decreases, and its color resembles that of a freshly blued shotgun barrel.

The females are dark silver gray, and, depending on the viewing angle, an olive green sheen is visible. A camera flash tends to fade the subtle blues and greens the eye can see, so you really must see this fish in person to appreciate its beauty.

The adult males of my wild-caught group are about 4 inches in size, and the females are slightly smaller at about 3½ inches. I have had the adults for many years, and I'd say they are full grown. I recently added another wild juvenile group of ten that are all about 2¼ inches, and even at that size, you can see the striking blue and silver heads of the spunkiest males of the group. In fact, one little male dropped straight to the bottom, started shaking over a rock, and displayed full color for a female that had been added only moments prior. The dominant adult male quickly put a stop to that, but the little guy was colored up minutes after hitting the water.

Little Torpedoes

Their aggression is usually what is hardest to manage, but I see this mostly in smaller tanks. Almost all the keepers I have spoken with about *M. myaka* report very high levels of aggression in their colonies, especially between males. Those with larger tanks and larger colonies usually report fewer casualties. My first colony of ten was 2 or 3 inches long upon arrival and went into a 50-gallon breeder. That housing arrangement lasted only a couple of days due to losing three males to aggression. The dominant male wanted most of the tank for himself and was absolutely intolerant of other males.

These fish are like torpedoes and will chase each other at such speeds that they become little black blurs, their golden eyes leaving trails in my photos like children writing their names with sparklers in the black of a July night. Dominant males will usually stay hovering above their territory, which is preferably a rock, but they will settle for driftwood as well.

Sometimes, when one sees a rival male, he will start to face off with him by swimming directly toward the other male, who seems to retreat a distance equal to that of its oppressor's advances. They will go back and forth at each other for many minutes, never closing the distance, and act as boxers, circling and sizing up one another. Then one, or both, will start to swim in small, tight circles, building up momentum and *pow*! They blast out of their orbits and go straight for one another. Contact can be anything from a light tag with quick retreat to a full-blown fight. The latter of the two is reminiscent of two Tasmanian devils from cartoons going at one another. All you can really see is a blur of black and silver tumbling and twirling through the water. Then, as fast as they were on one another, they are back to their territories, usually with little to no damage to either party.

However, this scenario does not end so well in smaller tanks, as there is nowhere to retreat outside of what the dominant male feels is his territory. In my experience, providing open space, not hiding places, is how you manage aggression in *M. myaka*. They just need space between them and they are happy, even within eyesight of another male. I can build all the caves my thousands of pounds of rocks will afford me, and not one single *Myaka* will seek refuge inside.

In contrast, males are not very hard on the females. There is some chasing, but it usually ends in a gentle push more than a blow. The chasing is more intense during courting, but I have never lost a female due to male aggression.

The same can be said about their attitude toward the *P. maclareni* that share the tank. My male *M. myaka* just move the *Pungu* out

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Troy Veltrop

■ Male *Myaka myaka* (bottom) feature a velvety black coloration that females (top) lack.

Troy Veltrop

■ Female myaka generally receive no trouble from males and coexist peacefully.

of the way with soft pushes. Females also hardly seem to notice the presence of the *Pungu*, except at spawning time, during which both sexes are almost obsessed with chasing them out of the spawning site—so much so, that I believe it is interrupting the spawning process. I have only seen one *M. myaka* spawn that resulted in a female holding eggs.

Yes, but Did You See the Eggs?

Just mention to long-time keepers of *M. myaka* that you have a holding female, and you'll probably hear them ask, "Did you see the eggs laid?" The reason for this was made evident to me the day I saw a female with a bulging buccal cavity. This was one of the few times in my life that you could have accurately described me as giddy while I readied an isolation tank in which she could safely incubate my prize. However, if the hour and a half of removing 200 pounds of rocks and chasing her round and round the tank wasn't enough to be a killjoy, imagine my disappointment when she spit a mouthful of pellets in the net after her capture. Yes, pellets, or pellet mush to be exact.

M. myaka have a tendency to devour anything that hits the water and squirrel it away in their mouths, plus they have this very odd-looking jaw, which is steeply angled. I am willing to bet that there is not one single keeper of *M. myaka* that hasn't done a double take, at least once, only to find their holding lady is actually hoarding food. Unfortunately, I had already hit the send button on the email to all my friends proclaiming my success before I netted her, so I now cannot deny having been tricked.

Many times since then, I have watched all three adult males go through the entire spawning ritual with all of the females, just without the blasted eggs getting laid. I have heard others describe the same activity in their tanks as well. A male will get all fired up and hover about 6 inches above his territory. When a female ventures near, he arches his body in a crescent shape and begins violently shaking and slowly lowering himself down to his rock. The female will lower herself to the rock and circle with him, acting as if she is laying eggs. Finally, the male circles to fertilize, shaking his anal fin on the rock while the female moves in to pick up the imaginary eggs. They do everything but lay the eggs. They will do the same ritual over driftwood or over a bare spot in the gravel at the base of a rock or piece of driftwood. Over and over, I watch them mock spawn. They frustrate me so much I cannot see straight! There was only one time that I saw a holding female, and she did not hold for long. This has been one of the most challenging fish to spawn of all the species in my fishroom, and I currently house over 70 species of fish.

Caring for *M. myaka*

Aside from the challenge of breeding them, *M. myaka* are easy to care for if given a large-enough tank. A large tank is even more important if you intend to keep an adult breeding colony with multiple males. Juveniles can be kept well in smaller tanks, but as they approach the 3-inch mark, the aggression escalates and larger quarters will be required. I currently keep a colony of 15 wild juveniles and adults alongside 20 wild *P. maclareni* in a 125-gallon with lots of rocks and driftwood. Although there are plenty of hiding spaces in the aquascaping, neither the *Pungu* nor the *Myaka* seem the least bit interested in the caves or each other. The *Myaka* like to claim the rocks as spawning territories, while the *Pungu* prefer to graze the algae from their surface.

I have had the tank set up in several configurations. One thing that I immediately noticed after switching from an open layout to a rock- and driftwood-filled layout was the *M.*

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Troy Veltrop

■ *M. myaka* forage on phytoplankton and insects in the wild, but they will take pellets, flake foods, and other standard fare in the home aquarium.

myaka went into a frenzy. In the open layout, males were much more relaxed and seemed to tolerate other males in closer proximity. They would just pick a spot in the open water and hover there until another got too close, and then they'd chase them off rather unenthusiastically.

Not so in the rocky layout. As soon as I placed the last rock in the tank and removed my arm, three of the *M. myaka* waged all-out war over the prime piece of real estate: a large rock along the back of the tank. This territory dispute lasted nearly four hours, but once sorted out, all three males began putting on vigorous displays for every female in sight. I would swear that there was so much shaking going on in the tank that the water at the surface rippled.

I tested this behavioral difference in an open layout versus rocky shore again when I set up a new 125-gallon tank for the *Myaka* and *Pungu*. The tanks were identical except that the first had a standard blue background, whereas in the new setup, I used a sort of sea green color for the background. I saw the exact same behavior as before. While I have not kept them in an open layout for any length of time, they never show the slightest interest in breeding until a good amount of rock or wood is added. Then they almost immediately shift into breeding mode the moment either is added to the tank. It is also worth noting that the sea green background color seemed to have a calming effect on both species and makes for a much more natural-looking environment once the rock and driftwood are added.

Filtration and water change requirements are pretty much the same as needed with most cichlids. I change 50 to 60 percent of the water each week and do filter maintenance in a bucket of tank water that I collect while vacuuming substrate. With as many tanks as I maintain, I use a 100-foot siphon to drain and fill; only one bucket is drawn off to rinse the filter media. My water supply is well water, so I do not add chemicals. The pH is just above neutral to slightly alkaline from the well.

I have fed everything from pellets to flake foods to frozen foods. *M. myaka* will devour most anything offered. They feed on phytoplankton and insects in the wild, but since I have always kept them with *P. maclareni*, I have fed them very sparingly when it comes to meaty treats. My next plan is to move the *Pungu* out to their own tank and start loading the *M. myaka* up with live and frozen foods. We'll see if some mosquito larvae, daphnia, or whatever else I can catch or culture will bring about some eggs in the next round of courting.

Tankmates

Although I have kept *M. myaka* with other species, I am beginning to think that a species tank may be in order for breeding. Presently, they seem easily distracted during spawning and actually pay more attention to chasing the *P. maclareni* than the task at hand. They can, of course, be kept in a community display tank and do quite well with other species from Lake Barombi-Mbo. If you choose to go with another species from the lake, there are several available in the hobby.

These species include fish from the genus *Konia,* which contains *K. dikume* and *K. eisentrauti*. Both of these species prefer open water, but *K. dikume* likes it much deeper. *K. dikume* prefers mosquito larvae, but *K. eisentrauti* mixes it up a bit, dining on algae, fish eggs, and small insects. I do not believe that *K. dikume* is readily available, but I occasionally see *K. eisentrauti* available. There is the monotypic genus, *Pungu,* with *P. maclareni*, which, as I've already implied, can be a fine tankmate for *M. myaka* and is also sporadically available in the hobby. There are four members of the *Sarotherodon* genus also from the lake. They are *S. caroli*, *S. linnellii*, *S. lohbergeri*, and *S. steinbachi*. All of these are phytoplankton feeders living in different areas throughout the lake. And finally, there is the genus *Stomatepia*, which is made up of *S. mariae, S. mongo,* and *S. pindu*. *Stomatepia* feed primarily on shrimp and insect larvae. However, *S. mariae* also eats small fish. *S. mariae* and *S. pindu* are also both easily obtainable fish.

Save a Species

If you are breeding fish for distribution, I recommend you keep them in a species-only setup or choose a radically different-looking species as a tankmate to minimize the chance of hybridization. Do not keep two species from the same genus together in the same tank. No matter what species is chosen, provide plenty of females for both species if you are going to breed in a community tank. I maintain six species from Lake Barombi-Mbo, including *K. eisentrauti*, *M. myaka*, *P. maclareni*, *Sarotherodon linnellii*, *Stomatepia mariae*, and *S. pindu*. I have only tried housing *M. myaka* and *P. maclareni* together, and the *Pungu* have bred in that setup. Personally, I think *M. myaka* will do best in a species tank, and I plan to test out my theory soon.

All in all, *M. myaka* is a joy to have in the fishroom and not all that difficult to manage if you give this species a larger tank. I hope you will grab a batch for yourself the next time you see them and join me in preserving them for future generations. Register your colony with your local fish clubs' C.A.R.E.S. Program and race me to the next spawn of this rare species. Without the efforts of many more of us, *M. myaka* may just become one of those fish you look for in five years only to find that no one is keeping it anymore or, worse yet, that it has become totally extinct.

Not as long as I have a colony, say I. What say you?

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LAWRENCE KENT

A FAMILY TRIP TO FIND FASCINATING FISH IN SOUTHEASTERN PERU

■ The Kent family ventured to southeastern Peru and encountered a melting pot of exotic fish and stunning locales.

Lawrence Kent

Choosing the right destination for a family vacation can be tricky when one member is keen on collecting tropical fish (me) and others are looking for something more cultural (my wife) or simply fun to do (my three kids: aged 8, 10, and 12). In 2010, we went to Nicaragua, which worked out great for everyone once the kids got over the initial shock of the rugged jungle accommodations. In 2011, we chose southeastern Peru to take advantage of the relative proximity of the Amazonian Basin (and its tropical fish), the Andean Highlands (and their Incan ruins), and Lake Titicaca, which has both interesting floating islands and unique killifish. It would be something for everyone, we hoped.

The Mother of God, Hell, and Tambopata

We flew from Seattle to Peru's capital, Lima, on the Pacific Coast. After a day of sightseeing, we took another flight toward the southeast, soaring above the snow-capped Andean Mountains before descending into the hot and humid Amazonian town of Puerto Maldonado. From the airplane's windows, we could see the Madre de Dios River ("mother of God" in Spanish) meandering its way through the rainforest like a giant brown snake cutting through a sea of green trees.

The Madre de Dios is the largest of a set of rivers in southeastern Peru that originate high in the Andes before pouring down into the low-lying jungle and continuing on into Brazil and Bolivia.

A guide drove us from the airport to a village called Infierno ("hell" in Spanish), where we boarded a 20-foot motorized skiff that took us on a two-hour trip up the river Tambopata into a national reserve. The Tambopata flows into the Madre de Dios, which eventually flows into Brazil and the Amazon River itself. Along the way, we spotted dozens of capybaras (the world's largest rodent), scarlet macaws, and other great birds, including the horned screamer and yellow-ridged toucan, before reaching our jungle lodge. We dropped our luggage, applied bug repellent, and then headed out on a night walk into the forest where we found big black tarantulas, little tree frogs, and a blunt-headed snake.

The Net, the Knife, and the Dwarf Fish in the Jungle

The next morning, we walked back into the jungle to look for a stream I could fish. I found a swampy, flooded area that drained into the Tambopata and threw my cast net into its black waters. This yielded a 4-inch cichlid from the genus *Bujurquina*, probably the *tambopatae* species. This group of fish is sometimes called the acaras. Females deposit their eggs on leaves, which are then guarded by both parents. They eventually pick up the larvae for biparental mouthbrooding. Although *Bujurquina* are rarely kept in the aquarium hobby, other South American acaras—such as the green terror (*Aequidens* sp. "silversaum")—are popular with fishkeepers, especially those who appreciate feistiness.

The next cast of the net yielded a characin—a silvery, large-scaled tetra with red eyes. It may have been *Moenkhausia oligolepis*, although there are many species of small silvery characins that look alike. The locals simply call them *sardinas*, or sardines in Spanish. We caught many types during this vacation.

To look for additional species, I grabbed a dipnet and waded into the muddy swamp to scoop up small fish among the aquatic plants

Lawrence Kent

■ The author's prime collection spot was the Madre de Dios region's Tambopata River, which included everything from fish to exotic birds.

Lawrence Kent

■ The author's children (left to right: George, Frances, and Moses Kent) traveled in relative luxury up the Tambopata, anxiously awaiting sight of wildlife.

growing in its margins. After each scoop, I handed the muck-filled net to my eight-year-old daughter, Frances, who was crouching on the bank so that she and her mother could pick through the detritus and pull out any small fish to deposit into a small tank for photos. This process yielded a knifefish and a dwarf cichlid.

The knifefish sported some tiger-like banding and was probably a *Brachyhypopomus* species. Knifefish do not have dorsal or caudal fins; instead, they move by undulating their long anal fins. They are also capable of generating electric pulses, which they use to uniquely communicate with others of their species. Several knifefish species are available in the hobby, but not those originating in the Tambopata.

The dwarf cichlid I caught was from the genus *Apistogramma*, a group of South American fish that are popular with aquarists because of their small size (about one inch) and large variability—there are thought to be over 100 species. The brood care of these fish is highly developed, as in most cichlids. All *Apistogramma* species spawn in caves, typically under rocks or in holes in sunken logs or branches. The species I caught was *A. luelingi*, which was yellow (as are most apisto females) with handsome black markings on its face and pectoral fins. It is seen only rarely in the aquarium hobby.

Hatchetfish and an Increase in Altitude

That afternoon, we got back into the motorized skiff and traveled another 20 miles upstream to a clay lick that attracts hundreds of macaws and parrots. We set up our tents on a sandy beach that was covered in fresh jaguar tracks. Our Peruvian guide took me, my son Moses (age 10), and my cast net along the riverbank to look for fish. Among the species we caught were a silver-dollar-like tetra with a bright red anal fin (probably *Tetragonopterus argenteus)* and a species of hatchetfish called *Thoracocharax stellatus*.

Hatchetfish are popular aquarium fish and widely available in pet stores. Their name derives from their hatchet-like, deep-keeled silver bodies. They are very buoyant and rarely swim more than an inch or two below the water's surface. They like to jump into the air and occasionally paddle rapidly above the water's surface, leading to speculation that the fish can actually fly. Hatchetfish, along with millions of other ornamental fish, are exported from Peru to the United States and other aquarium markets, but these exports originate in Iquitos in Northern Peru, not in the southeast where this business is yet to develop.

We continued fishing into the night, wading through the water, using flashlights to search for our targets, while mosquitoes sucked our blood and capybaras grunted nearby. Our lights picked up the eyeshine of a stingray (*Potamotrygon* sp.), making us a little nervous about the possibility of stepping on one accidently (their sting is dangerous and painful), but we kept moving until our guide spotted the fish he was hunting. He expertly tossed the net, leading the fish just right, and then hauled out a foot-long bocachico.

Lawrence Kent

■ The small-mouthed *Prochilodus nigricans* is toothless and feeds on fine detritus at the bottom of rivers.

The bocachico ("small mouth" in Spanish, *Prochilodus nigricans* in Latin) is toothless and has adapted to feed on fine detritus at the bottom of the river. It's a prized food fish in the Puerto Maldonado area but would be too big and dull looking for a home aquarium. We ate this one for breakfast.

After a couple more days on the river, a visit to Lake Sandoval (filled with handsome flag cichlids [*Mesonauta festivus*]) and the Puerto Maldonado fish market (filled with banded headstanders [*Schizodon fasciatus*] and the scary-looking, vampire-toothed chambira [*Hydrolycus* sp.]), it was time to move on to the cultural leg of our vacation. We flew to Cuzco, a beautiful city high in the Andean Mountains that once was the capital of the Incan Empire. It was 85°F when we left tropical Puerto Maldonado but only 45° when we arrived in Cuzco, despite the two towns being only 200 miles apart. An extra 9,000 feet in altitude makes a big difference!

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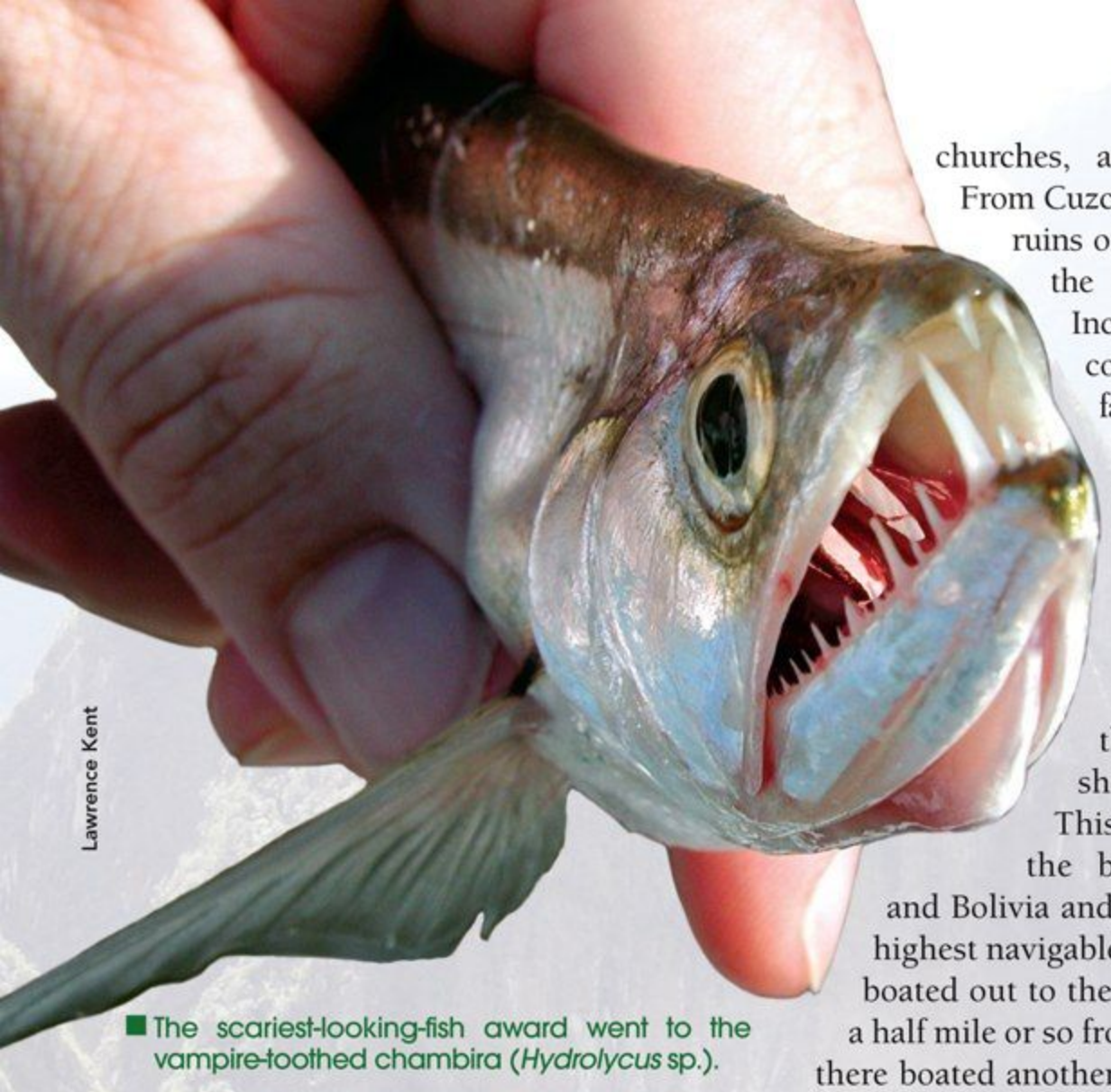

Lawrence Kent

■ The scariest-looking-fish award went to the vampire-toothed chambira (*Hydrolycus* sp.).

Lawrence Kent

■ A trip to Peru is not complete without a visit to the beautiful vistas of Machu Picchu's Incan ruins.

We stopped taking pills to protect us from malaria and started taking pills to protect us from altitude sickness.

From Cuzco to the Killifish of Titicaca

The kids enjoyed the just-plain-fun part of their vacation in Cuzco, shopping for knit hats, finger puppets, and other handicrafts, and my wife enjoyed the museums, colonial churches, and good restaurants. From Cuzco, we visited the nearby ruins of Ollantaytambo, where the Incan emperor Manco Inca outwitted the Spanish conquistadors, and the famous ruins of Machu Picchu, nestled high in the mountains and considered by many to be the most scenic place on earth.

We then took a long bus ride down to the city of Puno on the shores of Lake Titicaca. This huge lake straddles the border between Peru and Bolivia and, at 12,500 feet, is the highest navigable lake in the world. We boated out to the Uros Islands, situated a half mile or so from the shore, and from there boated another 20 miles to the small island of Amantani where we spent the night at the home of a local farm family (with no electricity).

The Uros are man-made floating islands constructed from bundled reeds. The islanders speak the Indian language Aymara and traditionally earn their living from fishing, though most now earn the bulk of their money through tourism. They showed us the huts where they sleep, their traditional boats (also made of reeds), and a bowlful of their local catch: killifish.

Lake Titicaca is home to a set of killifish species found nowhere else in the world, grouped in the genus *Orestias*. The ones we saw were light green and yellow, with upturned mouths, about 4 inches in length. They were unspectacular but unique. *O. ispi* and *O. mulleri* are said to be two of the more common species, but there are dozens, each only subtly different from the next. Reportedly, they are very difficult to keep in captivity. The waters they live in are cold, about 48° on average.

Lawrence Kent

■ A swampy area close to the Tambopata yielded a *Bujurquina* cichlid, which is rarely seen in the hobby.

Lawrence Kent

■ These large-scaled tetras with red eyes, possibly *Moenkhausia oligolepis*, are merely nicknamed sardines by the locals.

Unfortunately, the unique killifish populations of Titicaca are declining and at least one of the largest species, the Titicaca orestias (*O. cuvieri*), is now considered extinct. The cause is probably the introduction of new commercial fish species over the past half century into the lake, which brought new predators and new fish diseases. One of these introductions was the trout from North America, which now thrives in Titicaca. Another was the silverside fish, known locally as the pejerrey (*Odontesthes bonariensis*). On the island of Amantani, the local fishermen told me they hardly catch any killifish anymore. Instead, they capture and eat silversides (which they showed me, in bags) and farm trout, to which they sometimes feed the silversides.

Overall, our family vacation was a success. My wife loved the Incan ruins of Machu Picchu and the great Peruvian cuisine, my kids loved the shopping in Cuzco and the Pizza Hut in Lima, and I loved getting to know some of the tropical fish in the Amazonian headwaters near Puerto Maldonado and the coldwater killifish of Lake Titicaca. If you are a curious aquarist with an adventurous family, I recommend a vacation in southeastern Peru. Bring your cast net!

Lea Maddocks

Golden Garden

Add Koi and Goldfish to Your Pond for a Pop of Color Outside

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■ With the weather warming up, it's a great time to set up a pond outdoors for beautiful koi and goldfish.

For the northern hemisphere, summer is now in the air. To complement the colorful budding flora returning to our gardens, why not take your hobby outdoors and add a different splash of color with koi or goldfish?

History of Ornamental Pond Fish

As many aquarists may already know, our hobby was essentially born from keeping ornamental ponds and pond fish—a trend that began its popularity during the Tang Dynasty (618–907 BCE) in ancient China and has since gained popularity around the world. Orange and gold mutations of the common olive-green Prussian carp (*Carassius auratus gibelio*) were the first ornamentals kept and, over time, were bred into domesticated goldfish (*C. auratus auratus*). These domesticated variants now sport many color, body, and fin morphs to please the eye. Interestingly, it is noted in some books that the original ornamental goldfish varieties, particularly those with long, flowing caudal fins, were bred specifically to be viewed from overhead, i.e., in a pond or outdoor container. In essence, it seems these morphs are deigned to be best enjoyed as ornamental pond fish. Goldfish dominated as ornamental fish for hundreds of years, being popular across China, spreading in the 1600s to Japan, and reaching Europe and the United States by 1850.

Koi (which means "carp" in Japanese) are a considerably more recent development in pond fish. Koi are derived from the common carp (*Cyprinus carpio*), which was originally aquacultured for food both in China (during approximately 500 CE) and in Europe by the Roman Empire (27 BCE–400 CE). These fish also spread to Japan, where they were also aquacultured for food for many hundreds of years. As with goldfish, color mutations occasionally arose, and in the early 1800s, these were developed via selective breeding into colored koi, officially dubbed "*nishikigoi*" ("brocaded carp"). These colored koi quickly gained popularity as ornamental pond fish throughout Japan in the early 1900s. From this beginning, koi began spreading throughout the world as a beautiful feature fish in larger ponds and water gardens.

■ Outdoor ponds are ideal for viewing koi and goldfish, as many of these fish have been specifically bred to be viewed from overhead.

Introducing Fish

Once your pond is fully set up and running, stock it with pond plants and marginal plants, and then let it mature for several weeks to two months in colder climates to allow it to biologically cycle. Regularly testing for ammonia, nitrite, and nitrate will let you know when it is ready to introduce fish. Most small ponds will get going with bacteria introduced with pond plants, but you can supplement this with the cycling bacteria that are commercially available. Once cycled, add your fish one to two at a time, wait a week or two between increasing the stock, and monitor your metabolic wastes at all times. As with all fish, acclimate slowly, adding a small amount of

Brian Tan/Shutterstock

■ After a pond is fully set up and stocked with plants, it should be regularly tested before any fish is introduced.

water to the bag at 5- to 10-minute intervals, and release your fish once the bag is over 90 percent pond water. Do not add water from the bag to the pond to reduce the risk of introducing disease. Once nitrates are stable at 20 to 30 ppm (40 ppm maximum), your pond is fully stocked.

Keeping a Goldfish Pond

Available in various colors and shapes, goldfish are ideal inhabitants for smaller ponds. Bright orange or albino comets and shubunkin varieties with their calico markings do particularly well in ponds, as they are hardy, can grow quite large (up to a foot), and often have long, flowing tails to admire. These fish are able to survive most normal outdoor temperatures, though a source of shade to keep the pond below 80°F in summer is recommended and a heater to keep the pond over 50° in winter will reduce stress and be welcomed. Goldfish will go into a period of reduced activity or dormancy at low temperatures, resting at the base of the pond, moving and eating little, if at all. This is normal, and their liveliness will return when temperatures rise again in spring.

Fancy goldfish can also thrive in a pond environment, though they should not be kept in a place where the temperature swings greatly (i.e., a small pond in the sun, which is prone to temperature fluctuations, or at temperatures above 80° or below 60°). Fancy varieties are also more sensitive to waste, so keep your nitrates in check. In terms of space, you should allow at least 15 gallons or more per adult fish and ensure good oxygenation of the water. Goldfish can dig up some plants, so plants with thick stems, such as established lotuses, lilies, reeds, rushes, and floating plants, should be used with these fish. Feed a high-quality pellet or flake staple with supplemental feedings of frozen or live foods, ideally two to three times a day. They will relish some blanched leafy greens and frozen or live meaty foods as well as nibble at pond plants and snack on aquatic insects for additional nutrition. Kept well, goldfish can live in your pond for well over 15 to 20 years. If you have a very large pond, you can also keep goldfish and koi together.

Keeping a Koi Pond

If you have a large pond, you have the option of keeping koi. Koi can grow very large, up to 3 feet, and they can weigh up to 40 pounds. Like goldfish, they are social creatures, so you will need to house at least three to five. At least 200 to 300 gallons per koi is recommended, though some have had success with smaller ponds with excellent filtration. Nevertheless, it is best to provide them with the swimming space they need to grow and thrive. A 1,000-gallon pond would be sensible for a small koi pond housing three to four koi. Long and wide ponds at least 6 to 8 feet across will provide adequate swimming space, and some deep areas (4 feet or more) are also recommended for koi to overwinter in. As with goldfish, koi will reduce activity and become dormant at low winter temperatures.

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■ Reeds, lilies, and other thick-stemmed plants are recommended for koi and goldfish ponds; these fish have a habit of eating and uprooting any weaker plantlife.

Koi are also generally more destructive to plants, so you may need to use more periphery plants in your water garden and possibly mature water lilies in large, heavy pots that cannot be knocked over. Koi also prefer to be fed two to three times a day. A specific koi staple food is a must, though supplementing with peas, pumpkin, oatmeal, wholemeal bred, broccoli, spinach, beans, carrots, oranges, watermelon, and insect larvae (which they can obtain naturally outside) are excellent for treats and conditioning.

If you buy small koi, which is the cheapest way to obtain them, understand that the most growth occurs in the first two years, with fish growing in length on average 6 to 7 inches a year. This slows to 4 to 5 inches in the third year. Their maximum adult length will usually be reached at 10 to 13 years old. Pond size and health will dramatically influence the adult size of koi, with some reportedly growing over 4 feet, but most reach a size of 2 feet and a weight of approximately 15 to 22 pounds. Remember that koi can live over 30 to 40 years, and some are rumored to have lived well over 100 years. If you have a smaller koi pond and want a bit more life and color but are too short on space for more koi, you can add goldfish. They will generally coexist peacefully. Koi come in many color patterns, and by joining your local koi club, you might be able to find some rare or interesting varieties to add to your pond.

Pond Plants

Your climate and local nursery availability will dictate what pond plants you are able to keep for your pond, though the variety is wide and most hobbyists will be spoiled for choice. Most plants fall into the category of totally submerged plants, plants with surface leaves but with stems rooted in the substrate or in pots, free-floating plants that live and replicate on the surface, bog plants for planting in the shallows at the edge, or marginal water plants that like moist conditions near the pond but not necessarily in it. If you are after something unique, you may be able to order it through your nursery, via mail, or online.

Whatever plants you choose, consider how and where you will plant them, how they will spread, if they will require additional fertilization, pruning requirements, and other seasonal care. The most popular water plants used for most hardy ponds include water lilies, lotuses, reeds, rushes, water iris, elodea, and water lettuce, though your nursery will be able to steer you through the various types and variations within these species. Indeed, a variety of water lilies or lotuses alone can look striking. When keeping fish such as goldfish and koi, remember that sturdy plants are best, as these species are prone to eating and uprooting plants. Koi will even knock over potted plants on planting shelves. To prevent this, try placing large stones around root bases or using floating plants. Both fish will benefit from nibbling on plants, and as free-floating plants usually regenerate fastest, use of these to some extent is encouraged—though do take note that plants like duckweed can be very difficult to remove once in a pond. Using a net to scoop out large amounts of this now and then may be needed to clear the surface so you can see your fish!

General Pond Maintenance

Maintenance will generally be determined by your pond's size, stock, and filter system. However, most ponds will require some attention at least once a month. General maintenance will involve removing overgrown and rotten plants, leaves, and stems; cleaning out filters and skimmers; siphoning loose debris from the bottom; and conducting a partial water change to a level required to keep ponds clear and nitrates in check (usually 10 to 25 percent). And, as with aquariums, regular testing of pH, ammonia, nitrite, and nitrate is strongly recommended to ensure your pond's health is intact. Nitrates should remain under 40 ppm, ammonia and nitrite at 0 ppm.

A pH of 7.2 to 7.5 is optimal for most goldfish and koi, but they can tolerate a range from 6.5 to 8. Addition of aquarium salts containing calcium is also recommended

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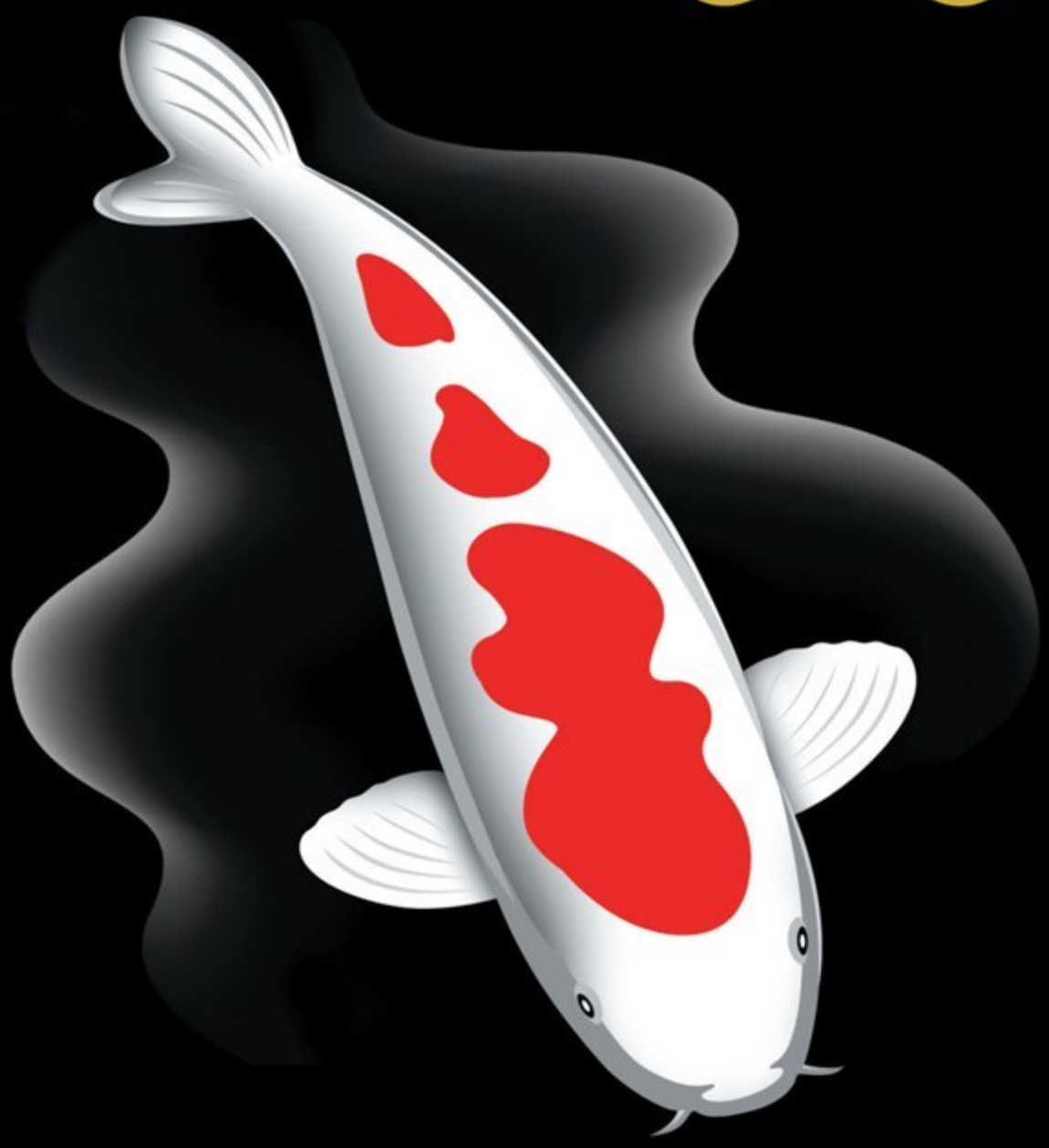

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■ Regular maintenance will ensure that your outdoor pond remains healthy and glowing.

to harden the water to levels appreciated by goldfish and koi, which are approximately 100 to 250 ppm or 6 to 13 degrees GH to improve their osmotic function. Raising carbonate hardness over 100 ppm or 6 degrees KH by adding bicarbonate is also suggested to improve pH stability and counteract any pH drops from decaying mulm at the bottom, which can produce nitric acid. Naturally, keeping parameters stable is the prime objective for any pond. In a newer pond, larger and more frequent changes may be necessary while it matures.

Season will also play a part in maintenance. Winter will require trimming back any plant die-off, ensuring any pond heaters are working well before frost sets in, and cutting back or even stopping feeding as fish become less active or dormant. Spring and summer will require increased feeding to match fish activity levels for growth and/or breeding. Plants may require the addition of fertilizers or pruning back if they grow excessively, insect pest activity should be monitored and addressed if need be (though fish will often relish mosquito larvae), and aeration should be checked to ensure it is adequate for keeping warmer water well supplied with dissolved oxygen. Autumn may require more regular clearing of fallen leaves from the surface and, again, adjusting of food supply to a level matching the activity of fish.

Should you encounter algae issues, check to see if the nitrate and phosphate levels are elevated. If so, ensure the filters are clean and functioning well and, if need be, reduce feeding or stocking levels. Also make certain that the pond is not receiving too much direct sunlight. Algae is more common in ponds subjected to excessive sunlight, overstocking, and maintenance errors.

It should be noted that while algae can at best be unsightly, it can at worst be fatal. If a large bloom suddenly occurs, it can potentially photosynthesize so rapidly during the day that it can supersaturate the water with oxygen, causing embolisms in fish similar to the bends in divers, which can be fatal if they occur in sensitive tissues like the eyes or brain. Additionally, the algae respires at night, causing large CO_2 build-ups that can cause deaths in the morning if aeration is inadequate. Algae blooms can also die off rapidly after consuming pond nutrients, quickly fouling the water with a large load of decaying organic matter that can then cause ammonia spikes followed by elevated levels of nitrite and nitrate. Ensuring a good regime of proper pond maintenance will keep algae-causing waste levels low and keep your pond clean, clear, and healthy.

Now that you're familiar with the basics, you should be able to make a great start in adding goldfish or koi to your pond. With some careful forethought and proper planning, you will be rewarded with a beautiful water garden and a fabulous feature to enjoy for many years. So, northern hemisphere readers, spring into ponds this year and have a great time taking your hobby to the garden—it makes me envious that I'm overwintering in Australia!

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An Aquarist's Journal: David Bell

Creating a Nano Reef

Part 2: Completion and Stability

■ A Duncan coral (*Duncanopsammia axifuga*) (front) thrives among zoanthid colonies.

David Bell

In the introductory installment of "An Aquarist's Journal: Creating a Nano Reef" (*TFH* June 2012), I described the complete process of planning for and building a 30-gallon nano-reef system. That process began over six months ago. Since that time, I have faced some minor obstacles, interesting situations, and even some unwelcome surprises, but overall it seems that a balance has been struck in the system.

Water Quality

Aside from using only RO/DI-quality water, I firmly believe that the most important action taken was to allow this system to run for several weeks with only high-quality live sand, live rock, and chemically inert filter pads to clear particulates. Though the system was completely cycled within 48 hours after the introduction of live rock, no other life was introduced for a period of four weeks and a skimmer was not added until the end of the tenth week. Although it takes restraint from immediately stocking the tank with even a couple of small fishes or corals, the intention was to allow the biological filter to develop unimpeded by chemical filtration or the foraging activities of fishes or invertebrates.

Several months later, I still find organisms living within the rock structure and sandbed that I did not intentionally introduce and have never observed there before. In addition, I am able to feed the inhabitants in moderation, as they are constantly observed grazing on the live rock and sand, a definite advantage in terms of water quality.

I add only supplements that are absolutely necessary to maintain natural seawater conditions. Even with minimal water changes once a week, I have found that calcium, alkalinity, and pH levels trend away from the targeted values between water changes, sometimes very quickly. As stated in part one of this article, I use a two-part liquid solution for the replenishment of calcium and alkalinity as often as two or three times per week and I adjust replacement and make-up water to the proper pH before adding it to the tank. This way, my water parameters never stray inordinately from acceptable parameters.

In addition, I add a few drops of an iodine solution on a weekly basis. I can see benefit in this, as the corals seem brighter with extended polyps, displaying a quicker response to feedings, and I have never found any of the typical coral pests doing their dirty work. I do not currently measure for iodine levels; I simply observe, but I dose only minimally and far below safe recommendations.

Algae Challenge

Despite having used only RO/DI water as the sole medium in this system, and having performed water changes on a strict schedule, I still experienced moderate to prolonged algae (and other) blooms on the substrate. I expect the appearance of various algae, bacteria, and diatoms, and I had no illusions that it would not appear in this system.

Although this is a normal part of the progression of reef systems, the cyanobacterial growth was excessive and occurred for a prolonged period. Despite persistent maintenance, this red slime (which can actually appear in a wide array of colors, including the blue green suggested by its common name) stubbornly persisted for weeks,

David Bell

■ Hardy corals that include zoanthids, mussids, and faviids dominate the nano reef.

David Bell

■ A colorful, vibrant micromussa coral (*Micromussa* sp.) (left) and a trumpet coral (*Caulastrea* sp.) (right) are flourishing.

just recently coming under control. It seems the cyano has been displaced by various desirable algal species (such as the calcareous coralline varieties) and some nuisance macro-alga species.

I am left to deal with the macro-alga, which has proved to be a lesser challenge to control. It is even now at a manageable level. Coralline algae continues to grow at a rapid rate, and I allow it to spread unchecked across the back and side walls of the tank. These are good signs that the system is reaching a point of biological equilibrium and maturity, but it is no time to let my guard down.

Patience and good-old-fashioned elbow grease are the first courses of action. Concerning the aforementioned cyanobacterial bloom, I dislodged and vacuumed this slime as needed, increasing the frequency of water changes, until the system moved closer to stabilization. Might a suggested product have eliminated this gunk? Perhaps, but I managed to get the problem under control through a more natural regimen of biological and mechanical means without having to be concerned about the side effects of chemical intervention. Therefore, I have no concerns about subsequent and unpredictable short- or long-range effects in that regard.

This is a good place to mention that there is one other supplement that I find beneficial. I dose a carbon source additive formulated for reef systems every other day. It may be no coincidence that a decline in cyanobacteria and algal forms occurred shortly after beginning this application, although a reversal must also be attributed to proper salinity, pH, and alkalinity levels; more frequent water changes; increased water motion; improved lighting; as well as the efforts of algae-grazing fishes and invertebrates. This product claims to promote more rapid bacterial reproduction and microbial activity by introducing an additional carbon food source for microorganisms, which in turn aids in de-nitrification while limiting overall system nutrients. After three months of use, the results have been positive with no apparent adverse effects. The bottom line is, the system seems healthier and better stabilized than ever before, and I will continue this product as long as this is the case.

Equipment Changes

I added a second circulation pump (rated at 550 gph) within the tank for increased water motion. Circulation that appeared entirely efficient and effective early on grew inadequate over time. This is largely due to increased reef structure from coral growth and the addition of new corals. Areas inherently become stagnant as coral grows and fills the interstices of live rock. Although it was difficult to pinpoint dead zones in the tank, it was easy to identify corals that didn't quite live up to expectations, despite still appearing generally healthy. Even as the reef structure grew and the tank became more heavily populated, detritus in this system has always been insignificant. The water is not clouded even by inadvertent disturbances of the sand bed, a good sign of an efficient biological filter. Even so, the increased water motion should promote coral growth, distribute food more thoroughly to all points of the tank for sessile invertebrates, reduce algal and bacterial growth, and ensure that detritus never becomes a concern. As a side note, I still haven't had the opportunity to add the sump I planned.

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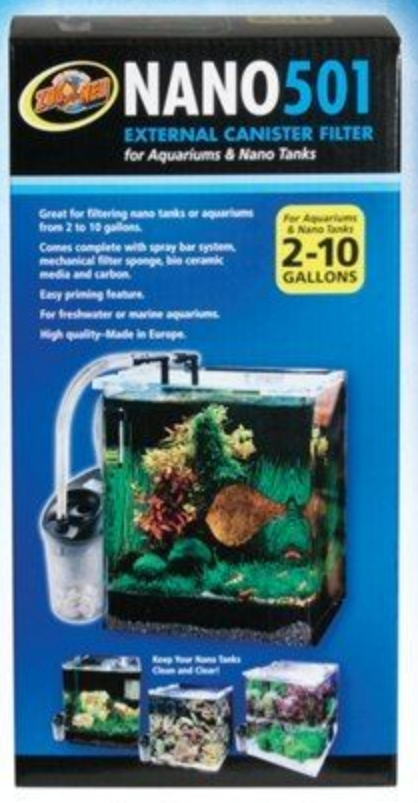

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David Bell

■ The turquoise brain coral (*Favites* sp.) is undemanding and as easy to sustain in prime health as other invertebrates on this reef as long as alkalinity, calcium, and pH levels are properly maintained.

Lighting

Although the power-compact lighting fixture seemed more than adequate for a 30-gallon reef system, it became apparent over time that even though octocorals, zoanthids, and mushroom corals flourished, some stony corals, such as the brain corals of the genera *Trachyphyllia* and *Lobophyllia*, tended to lose color intensity and looked less vibrant. As soon as I noticed that, I replaced this fixture with a high-output T5 fixture with a four-bulb configuration and built-in LED lunar lights. I run a combination of 420 and 460 actinics for twelve hours, and 10,000K and 12,000K daylights for about six hours daily. I immediately noticed significant improvement.

The integrated lunar lights are a considerable improvement over the add-ons I was using previously. Power-compact bulbs are also more expensive to replace than T5 bulbs, run hotter, and in comparison are somewhat limited in the availability of various temperatures/color ranges. I did have to adjust the heater upward to 78° F, discovering that the T5 bulbs run much cooler, no longer requiring a downward adjustment to compensate for heat transfer from the power compacts. A few corals that had lost color, most notably in the red spectrum, are regaining their former vitality. It seems algal growth has also subsided concurrently with the introduction of the T5 unit, probably not through mere coincidence.

Finding the Right Mix of Fish

Finding the right mix of fishes and invertebrates, if not somewhat challenging, has demanded closer attention to species traits because of the smaller water volume. Based around the had-to-have mystery wrasse (*Pseudocheilinus ocellatus*), I added tankmates that remain small and are docile. It is necessary to avoid overpopulating the tank, and the reef structure should be somewhat complicated to allow for the creation of many territories.

Having suffered the loss of a gorgeous red-finned fairy wrasse (*Cirrhilabrus rubripinnis*) to a belligerent azure damsel (*Chrysiptera hemicyanea*), which is normally quite demure and fairly sociable in larger quarters, I replaced the azure with a Talbot's damsel (*C. talboti*), which eliminated damsel aggression. This unexpected hostility demonstrates possible latent characteristics that may manifest themselves when normally well-behaved individuals are relegated to closer confines. Also, the starry blenny would not tolerate the presence of a Randall's goby, necessitating the removal of the latter.

Although I promised I wouldn't do this in the first article, I decided to add a very small twinspot hogfish (*Bodianus bimaculatus*) with plans to move it from this system to a much larger reef. The hogfish pestered some other fishes for short periods but then calmed down. Ultimately, the hogfish facilitated his own removal by launching himself from the tank in my presence. His timing was much appreciated, as I did not relish the idea of chasing him through a coral garden. I added him to his new tank, having suffered no ill effects. The only other loss was an orange-striped cardinalfish (*Apogon cyanosoma*), which simply disappeared in the night, most likely the victim of a lately observed larger crab (which had to be relocated) or a serpent star (doubtful), which also made a surprise appearance.

Experimenting with Corals

As a lover and collector of colorful and interesting zoanthids, these were the first corals I added to the system. I now have several small and thriving colonies firmly established. Their growth has been spectacular, not only in size but in coloration, which has continued to develop in variation and intensity within individual colonies, as some varieties exhibit patterns and colors that were not present initially. All were introduced as colonies of ten polyps or fewer, and some have grown to five times that number in only a few months! To date, I have not experienced any instances or signs of toxic aggression among the colonies, which I was prepared to find in a smaller system, having experienced instances of prolonged polyp closure in much larger reef systems until colonies could be thinned out and redistributed.

In addition to the vitality of the zoanthids, I have experienced a high degree of success with meat or closed brain corals, such as *Acanthastrea* spp. and *Micromussa* spp. I have three small groups of acanths and a mussa that expand, feed well, and show excellent coloration. I have

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David Bell

A clownfish adopts a hairy green mushroom coral of the genus *Rhodactis* as a surrogate host in the absence of an anemone, with no apparent harm to either individual.

realized success with the brain corals, which closely resemble the mussids. The upgrade to the T5 lighting system seems to have only furthered their vigor.

Other early and successful introductions include several of the octocorals (soft corals of the subclass Octocorallia). In fact, many of these corals have grown so rapidly that large groupings had to be removed to larger reef systems. Originally added as a 3-inch individual, a Kenya tree coral (*Capnella imbricata*), although not aggressive, grew to extraordinary proportions until it overshadowed many soft and hard corals nearby, adversely affecting their light and water flow requirements, before it was relocated. *C. imbricata* also reproduced regularly, with about 30 new individuals being transported to other systems or traded at the local fish store.

A rather hardy long-polyped variety of *Anthelia* spp. reproduced and spread so rapidly that it also had to be transferred to a larger reef system. Small daughter colonies of these species still inhabit the nano reef, which I extract from time to time to distribute elsewhere. I also relocated two very large corallimorpharians, metallic-green umbrella mushrooms (*Discosoma neglecta*) that were expanding up to 5 inches in diameter and were very territorial.

I also had some cnidarians die mysteriously, which was confusing to me because of previously exhibited health, long-term residence, and the fact that related congeners or conspecifics did not suffer these fates. I lost an orange plate coral (*Fungia* sp.) that simply dissolved overnight after it had thrived for several weeks, though it resided next to a green plate coral that continues to exhibit perfect health. These animals exist in large, dense communities in their natural environments and do not engage in turf wars with one another.

Likewise, a lime-green open brain coral (*Trachyphyllia* sp.) bleached, with its tissue melting away in a period of about 24 hours. It was one of the very first corals introduced to this nano reef more than six months ago and thrived right up until its demise. Another unexplained loss is the beautiful blue-green octocoral, a rather large colony that met its fate in much the same way. It was apparently healthy one day but began a steady decline and wasted away over a period of about three days. I do consider that these losses could have something to do with the constraints of a lesser water volume, inadequate water motion, or a lighting deficiency during the period prior to recent improvements of such. In any event, these animals simply went from exhibiting normal behavior to sudden and rapid breakdown, with subsequent remedial actions having no effect.

Other Changes with Invertebrates

As for other invertebrates, I found it necessary to replace the large 2-inch turbo snails (*Turbo fluctuosa*) with smaller varieties, as they were wreaking havoc among the rockwork with corals. A few *T. fluctuosa* do a fantastic job as algae eaters, but in a small tank, they were destructive to the point of dislodging corals that had even been cemented to the rock.

The large snails were relegated to other tanks and were replaced with smaller species from the genera of *Turbo*, *Trocus*, *Nerita*, *Astrea*, or *Cerithium*. I also recently added a blue tuxedo urchin (*Mespilia globulus*). I have always valued these animals for their consumption of nuisance algae, and a single individual in this tank is a great complement to the snails. In fact, the urchin hasn't shown any tendency to run roughshod over corals; it simply goes around.

Make sure you have enough for your animals to forage on. If algae is not readily available to snails and urchins, the individuals should be moved to other systems where food supplies are available, or they will surely starve. The *Nassarius* snails and hermit crabs have proved useful, as they constantly eliminate small amounts of detritus.

A Great Nano Setup

There is indeed a niche in the world of aquaria for nano-reef systems. A phenomenon that appeared to me as only a fad a few years ago has developed to the point where it has undoubtedly become a very successful industry within an industry. The rapid advancement of techniques and technological innovations related to small aquaria has propelled nano aquariums into homes and offices, where the work of accomplished aquarists allows others to experience the magnificent results and perhaps encourages them to learn and then build their own systems. Despite my inclination to keep systems simple and low tech, nano-reef systems available in today's market are quite advanced, with much guesswork taken out of the process. However, this does not absolve the aquarist of understanding and following fundamental principles.

Success can indeed be achieved in the nano realm. With patience and diligence to details in building a nano-reef system, and a never-ending commitment to maintenance requirements, it is my hope that you can also achieve highly successful results.

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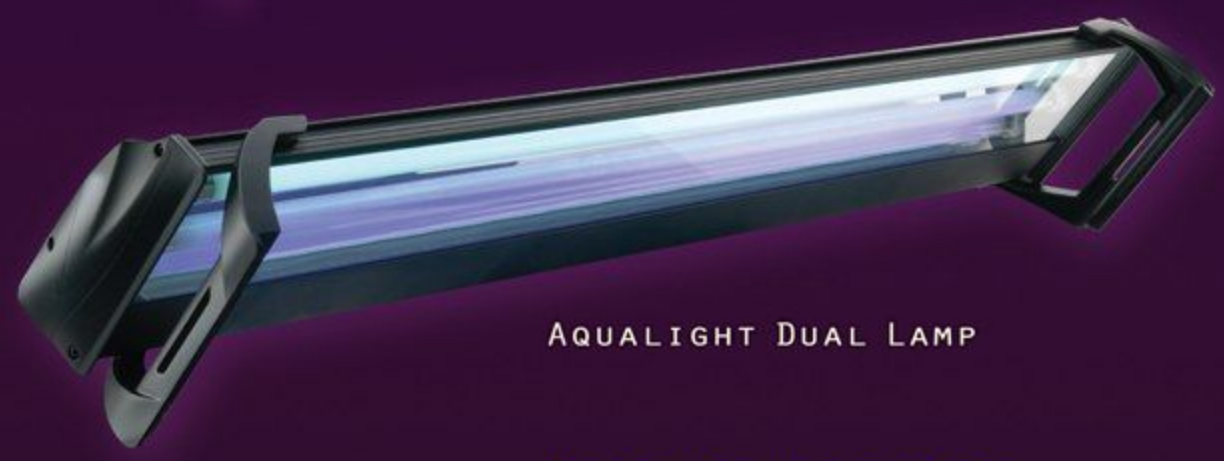

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The Importance of aquarium

Owning an aquarium is a wonderful experience that provides countless hours, if not a lifetime, of enjoyment. We must strive to provide an environment that is healthy and as close to nature as possible for the animals we keep. This is not only an ethical issue, but also a moral one, given the state of coral reefs around the planet. It is not environmentally responsible to have animals die in our tanks through negligence on our part, and this is where water testing comes in. A solid water-testing schedule and good lab practice, as well as record keeping, will help ensure that our tanks thrive and provide the best homes for the animals we keep. While testing water parameters probably ranks second only to water changes in most owners' list of least favorite things to do, it is by far one of the most important.

Part of initially setting up a tank involves testing the water daily and monitoring the nitrogen cycle. Owners patiently watch as ammonia converts into nitrite and then into nitrate. It is an exciting time for a new owner because the tank is coming to life. However, as the initial cycle ends, other aspects of setting up a tank become the focus—aquascaping, adding animals, etc. Even though the focus shifts, you have to continue to be vigilant about water testing to make sure that water parameters remain in an appropriate range.

As the bioload increases, so does the need for testing. For example, people can acquire a gorgeous new coral frag and proudly display it in the beginning, only to have it smothered in a sea of green hair algae. However, the whole problem could have been avoided with a combination of testing and water changes.

Best Practices

In order to test your water successfully, you must make a schedule beforehand, stick to it, and record the results. Keeping to a routine helps build good testing habits, which will help keep a tank stable because you should be able to spot a harmful trend before it reaches an emergency stage.

When it comes to scheduling, pick a day and time in which you are generally free and set up some form of reminder for yourself, as it can be very easy to forget otherwise.

water testing

Wesley Devers

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When testing the water, you are capturing only a snapshot of what is happening in the tank at that precise moment. While it is very important, it can never tell the whole story of what is going on in the tank.

In order to test the water, you don't need any advanced knowledge of chemistry. The test kits available today are very accurate, affordable, and come in many types to test for a myriad of parameters. It is very important to remember to follow testing procedures very carefully in order to obtain accurate results.

I keep all of my testing supplies in a plastic tote so, for example, I never have to search for my refractometer or waste cup. When I conduct my tests, I always have a container of RO/DI water on the left, my tank water on the right, the test kit I'm using in front, and a waste water container just to the side of that. Both the RO/DI and tank water containers are clearly marked, and each has a marked pipette as well so I never have to worry if there is any residue in my clean water.

I also went to a medical supply company and bought several 10-ml IV syringes. This type of syringe has a plastic needle tip that is typically used for adding medicine to an IV line. The graduations on some test kits are woefully inaccurate, which could lead to poor results while testing. Using a medical-grade syringe will guarantee that 5 ml is 5 ml.

Lab Procedures

Before you get into the procedure, I suggest keeping several items nearby. First, make sure you have paper towels. You are going to spill something, whether it is your tank water or a reagent. I actually use oil-absorbent mats under my work space, but I still keep paper towels on hand as well. Second, it is often handy to have a bright light available. Oftentimes, reading a color is impossible at worst and difficult at best, and home lighting is generally not bright enough. The bright light will eliminate those problems. Lastly, have a reliable method of keeping time available. Many tests require mixing or reacting over a set time, and keeping accurate time is necessary. Some tests can lose color very quickly, and missing the time mark can result in a false reading.

Regarding test kits, it is extremely important to check the expiration dates. Throw away and replace expired test kits because reagents can lose effectiveness over time and some may even become nonreactive.

Here is my procedure for testing water. By doing this every time, I can verify my results, ensuring they are accurate.

1. Collect a sample from the tank in the same location every time
2. Place a container of RO/DI water on the left
3. Place a container of sample water on the right
4. Place a waste container to the side but in front
5. Rinse the first parameter test tube with RO/DI water to remove any residue
6. Rinse the first parameter test tube with sample water to remove the dilution effect
7. Draw a sample into a 10-ml IV syringe and expel back into sample container, which removes bubbles; redraw 10-ml sample
8. Add an appropriate amount of sample to the test tube according to instructions
9. Follow all instructions as written by the manufacturer (and make sure accurate time is kept)
10. Read sample and log on data sheet/notebook
11. Discard sample into waste container
12. Rinse test tube with RO/DI water
13. Replace all items for completed test into manufacturer's container
14. Start at step one for next test

While this may all seem very trivial and/or possibly obsessive-compulsive, I know that when I test my water, an odd reading

Laura Muha

■ Many of today's water-testing products are easy to use and allow hobbyists of any skill level to accurately obtain aquarium parameters.

it and might even bleach. That testing error would have suddenly become very expensive.

Using the Results

Recording readings is one of the most important things to do when testing water. Accurate recordings show long-term trends—they are able to show what a tank has done and what it is now doing. This can have great practical applications. For example, imagine that you have a great tricolor *Acropora*. After six months, the coral is doing fantastically—it begins developing color very well with nice skeletal growth. Two months later, you notice an obvious decrease in growth and color. Testing your water and keeping accurate records will allow you to see that during the time of great growth, you dosed an amino acid supplement or that your alkalinity was higher than normal. Two months later, you tests as well as any events. Whenever I add a new fish or coral, when I change bulbs, dose a chemical, or do a water change, I write it in my events section. Not only does this provide you with a detailed account of your tank's progress and health, it can also be a very interesting read to see what you have in your tank.

The spreadsheet automatically graphs my readings when I enter my test results. Averaging all samples for each parameter, the graph calculates a running average and shows a trend line. The running average shows stability of the tank, while the trend line is an indicator of things to come. The graphs visually show what my tank is doing, and it is very informative to see what my tank has done over its lifetime. An example of how this works can be seen in the specific gravity of my tank. Even though I have had several fluctuations over a year, my specific gravity is averaging 1.025 and my trend is upward. I am sure that my current


The author keeps a record of his water tests in order to monitor trends within his tank.

Date	NH_4	NO_2	NO_3	PO_4	pH	Ca^+	Mg^+	Alkalinity			Salinity	SG	Temp
	Ammonia ppm	Nitrite ppm (mg/L)	Nitrate ppm (mg/L)	Phosphate ppm		Calcium ppm	Magnesium ppm	meq/L	dKH	ppm	ppt	Specific Gravity	F°
Averages	0.0	0.2	8.4	0.00	8.1	421	1,307	3.55	9.9	177.4	33.86	1.0252	79.86
9/10/10	-	0.5	0.0	-	8.4	-	-	-	-	-	35.00	1.0270	-
9/14/10	-	0.5	10.0	-	8.0	-	-	-	-	-	33.00	1.0245	77
9/17/10	-	2.0	18.0	-	8.2	-	-	-	-	-	34.00	1.0250	75
9/19/10	-	3.0	30.0	-	8.2	-	-	-	-	-	34.50	1.0258	75
9/21/10	-	2.0	30.0	-	8.4	-	-	-	-	-	34.00	1.0250	76
9/22/10	-	0.0	20.0	-	8.2	-	-	-	-	-	33.50	1.0250	76
9/24/10	-	0.0	20.0	-	8.2	-	-	-	-	-	34.00	1.0255	78
9/26/10	-	0.0	20.0	-	8.2	-	-	-	-	-	31.00	1.0225	78
9/28/10	-	0.5	20.0	-	7.9	-	-	-	-	-	31.39	1.0225	78
10/1/10	-	0.5	30.0	-	8.1	380	-	-	-	-	31.00	1.0235	78
10/3/10	-	7.0	40.0	-	8.0	360	-	-	-	-	32.00	1.0238	78
10/5/10	-	0.7	20.0	-	8.2	320	-	-	-	-	32.00	1.0238	78
10/7/10	-	0.0	20.0	-	8.2	340	-	-	-	-	30.00	1.0220	78
10/9/10	-	0.0	20.0	-	8.2	360	-	-	-	-	32.00	1.0235	78
10/11/10	-	0.0	10.0	-	8.2	380	-	-	-	-	32.50	1.0240	78
10/14/10	-	0.0	20.0	-	8.2	420	-	-	-	-	31.00	1.0230	78
10/16/10	-	0.0	20.0	-	8.2	420	-	-	-	-	31.00	1.0230	78
10/20/10	-	0.0	20.0	-	8.2	380	-	-	-	-	32.50	1.0240	78

is most likely due to a parameter that needs adjustment. If a reading is out of range, I always retest to make sure I did not make a mistake in my first test. If that reading is grossly different from the first, I will test a third time. I do this because test kits are cheap, but my tank's health is not. Always retest before adjusting your tank.

Think of it this way: if an alkalinity test shows a low dKH, you might want to dose a specific amount of carbonate. The test was actually in error, however, and the low alkalinity was actually in the normal range. The excess carbonate added will most likely depress calcium in the tank. The tank parameters are now swinging between extremes, and your high-end small-polyp stony corals suffer for stopped dosing and/or your alkalinity had fallen. Without accurate records, you very well may not remember previous actions and would have to begin a guessing game to save the coral.

The best method for keeping track of parameters is to write them down, always using a waterproof pen or a pencil. A notebook or a field sheet is the most convenient way to keep track of water quality tests, but it is a great place to record additions to a tank or treatments performed as well. If you use a notebook, dedicate it for just that purpose.

Keeping and maintaining records on a computer is obviously the easiest method given the number of programs available today. I developed a simple database using a popular spreadsheet program to record my tank water upward trend is due to an accident I had with my automated-top-off system when I was on vacation. The specific gravity decreased significantly while I was gone, since too much fresh water was being added, so I have been working to bring it back up, causing the upward trend.

Test for the Future

While testing water can be a boring and tedious task, taking the time and making the effort to test correctly will assuredly increase the health of your tank and its inhabitants. Remember to make a schedule, stick to it, and record the results. A healthy tank makes for a more enjoyable experience as an owner, and not only is that better for the hobby, it is also better for the planet.

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■ A reef tank with a race car decoration was built for Indy car driver Ryan Hunter-Reay in the *Fish Tank Kings* episode "Finsanity."

Courtesy of Lindsey Snell/NGCI

The Miami Marlins' request for a backstop aquarium seemed impossible. How could you put an aquarium where it could be hit by baseballs flying at over 80 miles per hour? Living Color Enterprises, Inc.—focus of Nat Geo Wild's new reality TV show *Fish Tank Kings*—proved that not only could it be done, but it could be done with style.

A Bulletproof Aquarium?

Mat Roy, president of Living Color, is enthusiastic about all kinds of aquarium builds. He is known for promising the world to his clients—offering everything from the backstop aquarium to using a submarine to acquire fish for a deep-water themed aquarium—and then expecting his team to deliver the results.

In the first episode, Mat is approached by David Samson, president of the Miami Marlins, about installing a fish tank at the new Marlins Park. "He said he wanted to put them on the field and replace part of the backstop, and I thought immediately, well that's just kind of nuts," Mat explained, adding, "Obviously the first concern was how do we protect the fish?"

After carefully coming up with a design, the team figured out a way to keep vibration out: The tanks are set in neoprene, which sends vibration through the concrete instead of the acrylic, are made out of stainless steel, and are covered with a fiberglass coating. Perhaps most important, there is a ¼-inch-thick, polycarbonate, bullet-resistant shield in front of the aquarium that will withstand an object hitting it at about 200 miles per hour. Between the shield and the tank is an air gap about 1½ inches wide, preventing anything from hitting the aquarium directly.

"We took pitching machines and a player, and we were hurling baseballs at close to 100 miles per hour, and we studied the top of the aquarium. The aquarium remained very still, there was absolutely no vibration that hit the water," said Mat. "The president of the Marlins has since, with fish in the aquarium, thrown balls at it as well to see if there were any impacts on the fish. It had absolutely no effect on the fish, whatsoever. They've had multiple home games so far; we don't see any signs of disease or stress. They're all eating well and doing well."

Courtesy of NGCI

■ The Living Color team assembles a tank for Marlins Park in "Inning Catch."

Courtesy of NGCI

■ Francis Yupangco (left), Living Color's head marine biologist, attempts to net some sharks in "Pimp My Tank."

Natural-Looking Setups

Of course, not all of their builds are as controversial as the Miami Marlins aquarium. Living Color actually did not even start in the aquarium installation business; it started as an aquarium-maintenance company in 1988.

As the client base grew, so did their demands. People started wanting larger aquariums, changes to their existing aquariums, or new fish. Originally these projects were simply coordinated by Living Color, with different manufacturers doing each component, but eventually the company moved the manufacturing work in-house. Then the business expanded from residential clients into commercial ones and ultimately into themed exhibits for places like public aquariums and theme parks.

Living Color is now involved in all aspects of production, from creating the aquarium and insets to the cabinetry surrounding it. All the setups are considered turnkey installations, meaning that all the filtration and equipment are ready to go for the client.

They are also known for creating setups that have a natural look to them. "We don't really do whimsical, weird aquariums. When a customer comes to Living Color, they're looking for a slice of the ocean. We do realistic replications of the actual environment, and that's what we're

Courtesy of Lindsey Snell/NGCI

■ Francis (left), Living Color Senior Project Manager Ben Alia (right), and diver Frank (center) talk about the shark transport tub for the "Card Sharks" episode.

Courtesy of Lindsey Snell/NGCI

■ A cichlid farm worker nets fish for "Extreme Tankover."

about and that's what we do and excel at," explained Francis Yupangco, a self-described lifelong fish geek and Living Color's head marine biologist.

"Living Color would lean more towards the fish in the way that we design an aquarium, and it's not just the filtration—which of course is the heartbeat—but more importantly what is part of the exhibit on the inside. We want to create swim-throughs, and caves, and places for fish to hide, so they will be less under stress, and they feel more comfortable, and they can create their own little home, if you will, within the reef systems that we build. We explain that to the clients, and they understand that," said Mat.

Fish and Famous Tanks

In certain cases, it is even more important than usual to accurately depict the ocean, as shown in the episode featuring a very popular nationwide restaurant chain: the Rainforest Café. Francis found the Rainforest Café tanks to be a particularly fun challenge. "Our client in that instance was not only the Rainforest Café, but their director of biology, Jim Prappas, and he is in charge of 28 Rainforest locations plus a large number of public aquariums for the Landry family. He is very, very well respected in the public aquarium industry, and he knows exactly what he wants—he wants things to look a particular way and be very accurate. So what we had to do was come up with customized colors on the corals, paint the reefs a particular way, and develop some new corals for our collection," he said.

Living Color's Production and Safety Manager, Jose Blanco, also finds it important to use fish tanks to help teach children. In one episode featuring Miami Heat basketball player Alonzo Mourning, kids from the Overtown Youth Center make a trip to Living Color to design inserts for the freshwater aquarium being built for the center. "That project for me personally was really rewarding to see; these kids are really enthusiastic about the project, and to have that aquarium not only as something that they can work with and stuff, but something educational for them," he said.

"Just to add to that, I think that when the average child keeps a small, 10-gallon aquarium, when they have a goldfish or betta in there, they're going to gain a greater appreciation for the natural world. It's just human nature that you're going to want to protect or care about something that you know about or you're educated about. In a greater sense, I think that aquariums are a great tool for conservation and teach young people how delicate the aquatic world is," said Francis.

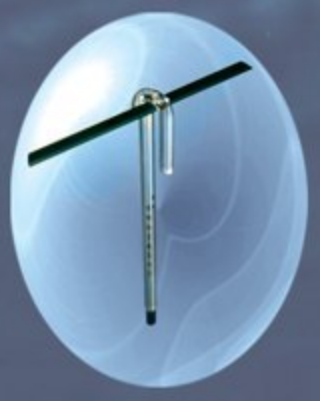
A True Reality Show

The show features a large number of species, and Francis stresses that every one of them is taken care of correctly. He mentioned that National Geographic reviewed each episode for accuracy and asked for scientific research to back up claims made in the show when appropriate.

According to Mat, "I think the show is unique, and I think it holds true to the industry. Like any reality television show, there is some scripting because they're trying to throw out worst-case scenarios and best-case scenarios. But at the end of the day, Living Color is always the hero, getting the project done, and more importantly, every single one of those projects is done correctly. That was the foremost of everything that we were doing—we were not going to rush into a job just to get it done to put it on film. These are real projects; these are real clients. That's the way it is."

Fish Tank Kings airs Saturdays at 10 p.m. (ET/PT) on Nat Geo Wild.

TURN DREAMS...



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The Bowers Boys

Sam Jaffe

■ Ned (in burgundy tee) and Dan (in hat) Bowers run Uncle Ned's Fish Factory, one of the largest fish stores on the East Coast.

Tony and Rose Orso

Ned Bowers, also known as Uncle Ned, and fellow aquatic mastermind "Brother Dan" run one of the best retail tropical fish stores on the East Coast of the United States. Rare, unusual, hard to find, or just plain bread and butter, if they don't already have it in their store, they'll get it for you.

Starting As Kids

It all started innocently enough when their father bought his children a 10-gallon fish tank in lieu of a dog. We all know the logic behind that move; it's easier to get rid of a fish tank when the kids lose interest. That didn't happen in this case, and the Bowers boys were off and running.

Ned read everything about fish he could get his hands on at the local library. Eventually, he found *TFH* and other fish publications and asked for subscriptions to these as birthday presents.

Together, the boys started selling mail-order fish from their parents' home some 30 years ago. Spending time working at two different pet stores in the area furthered Ned's knowledge and passion for fish, and there was only one place to go from there.

One might imagine how the name "Uncle Ned's Fish Factory" came about, but the choice was simple. Ned and Dan were both uncles to three, they bought and sold fish, and the store is located in a factory.

An Unusual Store

Not the usual "Pet This" or "Fish That," Uncle Ned's, like Willy Wonka's factory, is something you are unlikely to forget. This holds true for both the name and the store itself.

In the spring and summer, a section of the parking lot becomes an outdoor water garden center. Fourteen ponds filled with goldfish and koi guarantee that there is something for every budget. In addition, ten ponds of water garden plants are available to help complete your outdoor oasis.

The layout inside the store is one room leading into another, which is kind of neat because you don't know what's around the next corner until you get there. Believe me, it's worth the suspense. There are several species in each tank, and you can bet on seeing something you haven't seen in years or something you have never seen before.

There are 170 tanks throughout the store, ranging in size from 2 gallons to 225 gallons. Right now, all but five are freshwater. On the drawing board this coming fall are possible plans to make room to expand their selection of saltwater fish.

Filtration is best described by Ned himself: "Our small tanks are filtered with air-driven foam filters and internal power filters. For the large tanks, I use outside power filters, canister filters, and humongous power sponge filters that I made.

■ Three-spotted eartheater (*Satanoperca daemon*); Uncle Ned's Fish Factory features over 170 tanks, all of which feature gorgeous, thriving species for sale.

Sam Jaffe

Basically, it's a 30-gallon sump with a full-size vertical foam block 2 inches thick."

A nice selection of dry goods complements the fish selection, and they use and recommend these products to their customers. Special-ordered dry goods are usually shipped to the store within a few days.

Ned and Dan are currently in the store full time, and they have five or six excellent employees working part time. Former employees, old friends, and new friends stop by to visit and help out on a regular basis. When I asked Ned about his employees, he sent me a full-page list of everyone who has helped him over the years. Not only did he give me each of their names, but he also included a vivid description of just how

■ *Fundulopanchax fallax*; Ned and Dan are passionate vendors who put their customers first, going so far as offering an online forum for fishkeeping advice and other discussion.

Sam Jaffe

■ *Neolamprologus brevis*; Ned recommends that new fishkeepers should first figure out their available space and budget before setting up a tank.

Sam Jaffe

they have helped. I hope all of you who are on his list know who you are so I can pass along a huge thank you from Ned and Dan. All of the photos for this article were taken by Sam Jaffe, a long-time friend and employee. Sam is now a professional photographer but still finds time to drop by and help Uncle Ned and Dan.

With 18 or so years under their belts in a retail fish store that is still thriving, one can assume they are doing something right. Who better to ask what the hobby is like now and where it is going? "Hard to say, people's tastes change rapidly. In cichlids alone, one year everyone wants Central Americans, the next year it's Malawi fish. Right now, micro tanks, small fish, and colorful little shrimps are popular."

With respect to things changing, one of Ned's biggest frustrations is that manufacturers discontinue many useful products on a whim. In some instances, the suggested replacements for these products do not perform as well as the ones they discontinued.

Another concern is the future of fish medications. "I worry that over-regulation will eliminate their availability. Some are very necessary for the aquarium hobby. "

Ned passes on this advice for those interested in setting up a fish tank for the first time: "First, figure out your space and budget. For example, a 75-gallon freshwater tank will cost about $600 and is 4 feet x 18 inches. Second, figure out which type of fish you want to keep. If you must own a cobalt blue zebra cichlid from Lake Malawi, and if you must own cardinal tetras from Brazil, then you must own two different fish tanks! Third, keep a list of the species in your tank. When buying new fish, bring this list along so we can help you find appropriate tankmates for the existing inhabitants."

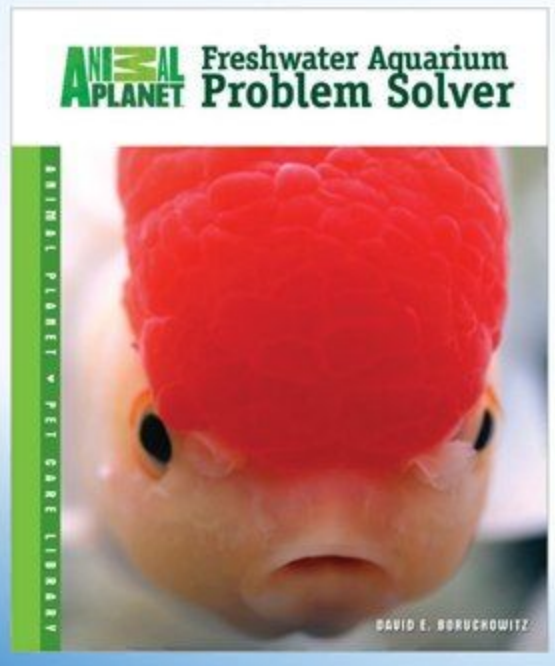
"Fourth, be aware of the needs of the animals you want to keep. If you know you only have enough money and space for a 3-foot-long, 30-gallon tank, don't even consider getting a fish that gets to be 18 inches long. I am 5 feet, 9 inches tall—I will fit in a room that is 5 feet, 10 inches tall, but I won't like it! I will not sell any fish that I will not take back."

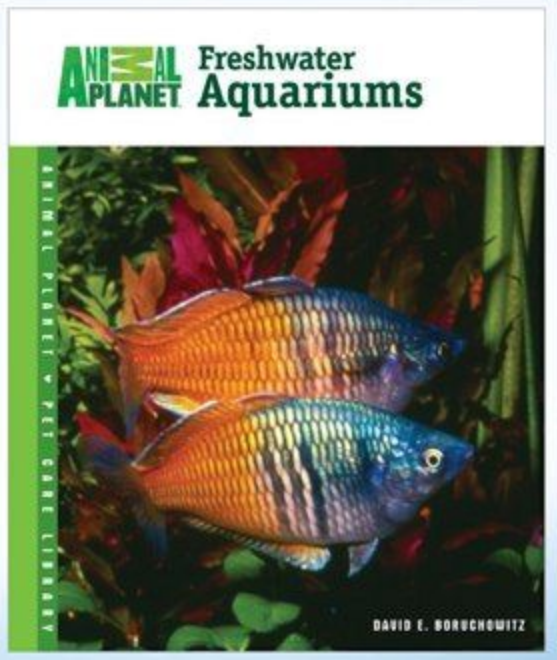
Putting Customers First

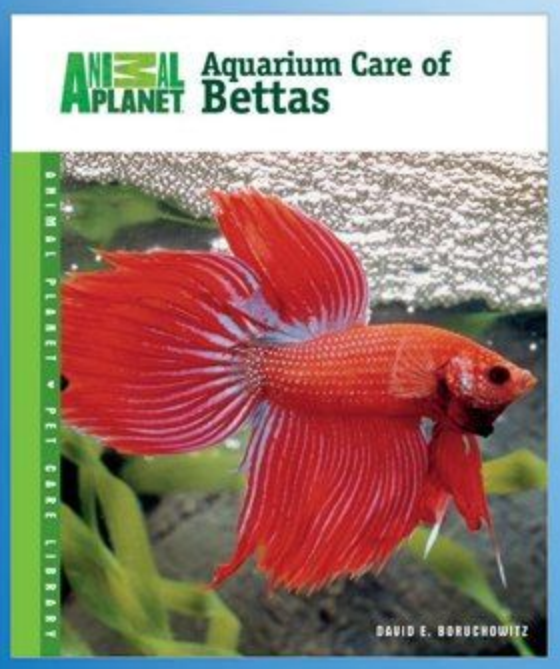
Uncle Ned's does not have online ordering, but if someone needs something, they can call and have it shipped to them. On their website, under forums, there are lists of new arrivals and fish available by special order. These forums are updated quite often, and they also contain some great advice (e.g., one update is a how-to for fish folks who experienced power loss with the inclement weather we had here on the East Coast).

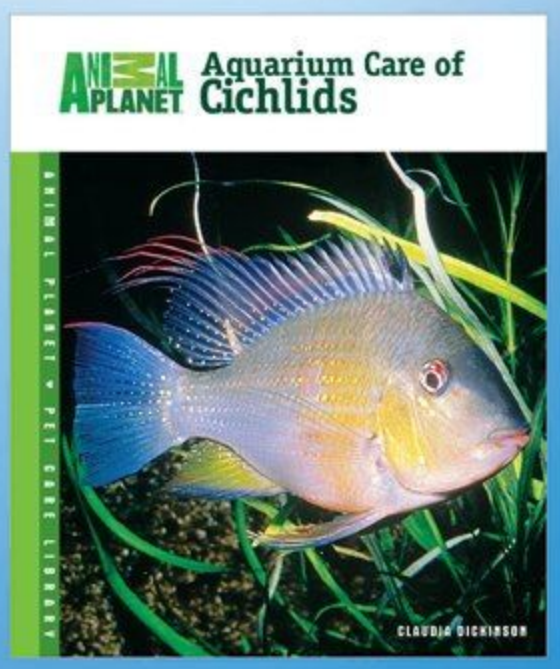
All joking aside, the Bowers boys take care of their customers. Ned and Dan both have a passion for fish, which makes them worth seeing not only for their stock, but for expert advice and all the necessities to care for them properly. On any given weekend, you can see some of the old-timers in the hobby peeking into tanks at Uncle Ned's or just hanging around. It really is a family—a fish family!

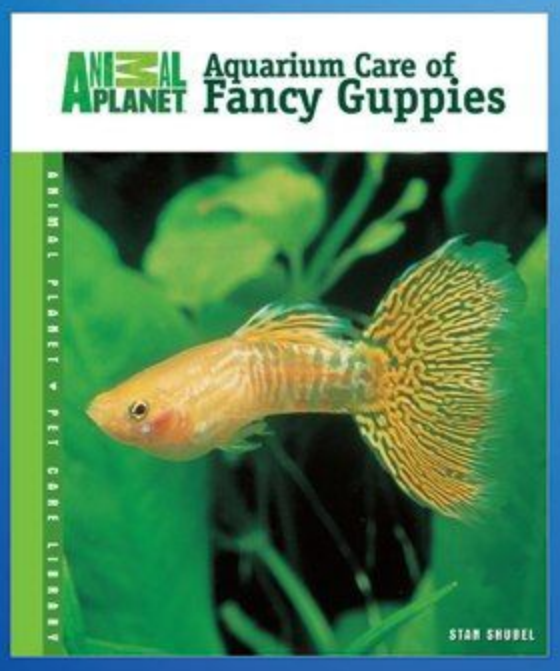
Uncle Ned's Fish Factory
1590 Main Street (Route 109) Millis, MA 02054
Telephone: 508-533-5969
Website: www.unclenedsfishfactory.com

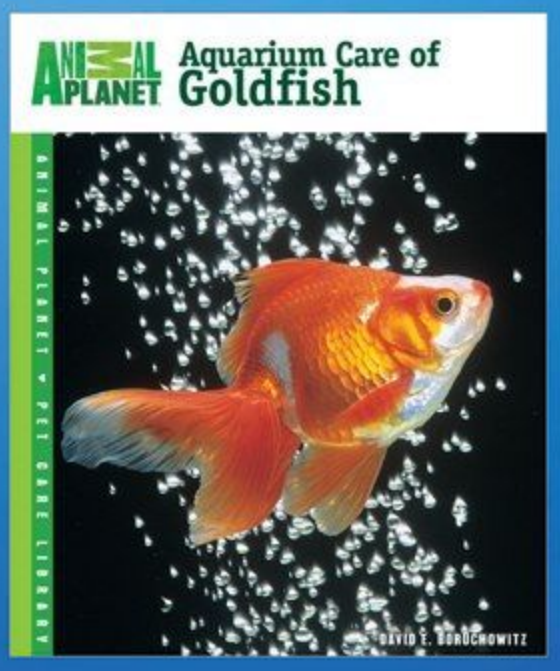


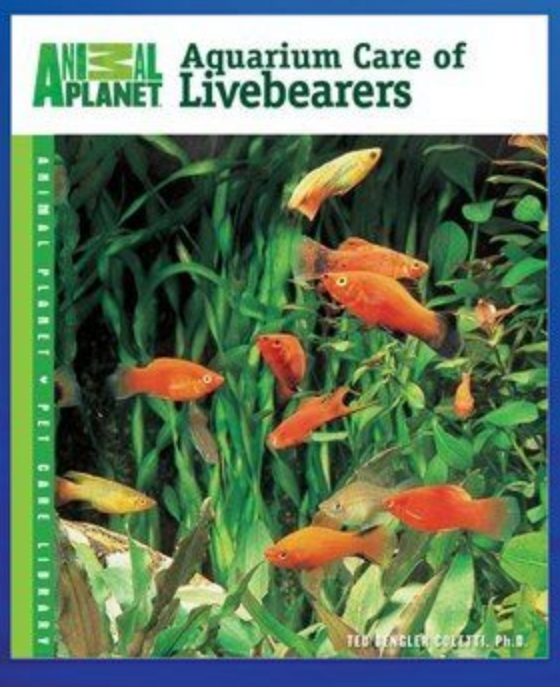


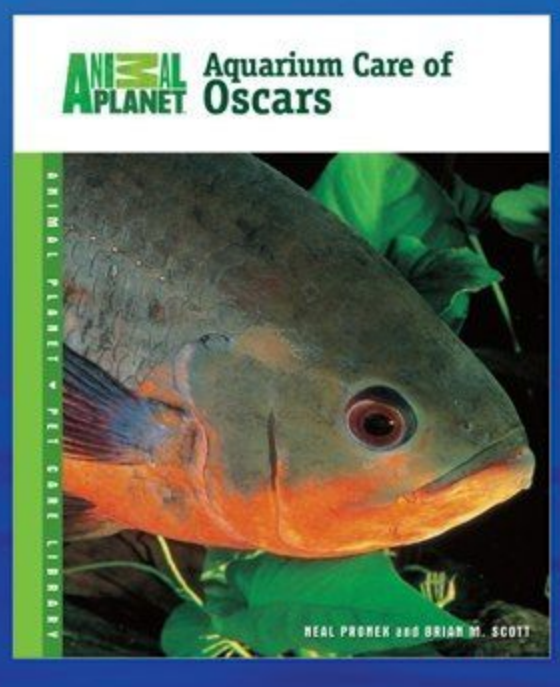












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From setting up your first aquarium to breeding African cichlids to solving fishkeeping problems, the Animal Planet® Pet Care Library freshwater series has you covered! Each one of the eight books contains practical aquarium advice written in an enjoyable and easy-to-read style. The colorful photographs help identify species, show the warning signs of fish illnesses, and illustrate other key topics. Your fish may not be able to read, but they'll get a lot out of these books!

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events

June 21–24 • Atlanta, Georgia

The 2012 North American Discus Association Discus Show will be held at the Sheraton Gateway Hotel in Atlanta, Georgia. The show will include a variety of classes for showing fish, such as solid, spotted, and wild. Andrew Soh, Dick Au, Dieter Uttergasser, and other speakers will also be present. For more information, visit **http://nadaatlanta2012.com.**

July 7 • Champaign, Illinois

The Champaign Area Fish Exchange is holding a public auction at the Urbana Civic Center in Champaign, Illinois. Fish, plants, food, and equipment may be presented for sale. Doors will open at 8 a.m., and the auction will begin at 10:30 a.m. The event is open to the public, and admission is free. For more information, visit **www.champaignfish.com.**

July 11–15 • Indianapolis, Indiana

The 2012 American Cichlid Association (ACA) Convention will be held in Indianapolis, Indiana. Headlining the event will be a lineup of speakers that includes Ad Konings and Dr. Paul Loiselle. Events include a fish show, Sunday auction, and much more. For registration and event updates, visit **www.aca2012indy.com.**

clubs

REGIONAL

American Cichlid Association

Come join in the largest and most distinguished national organization of the cichlid hobby! Your membership in the American Cichlid Association (ACA) entitles you to six issues per year of our highly acclaimed Buntbarsche Bulletin and access to our online Trading Post, and each July the ACA hosts a fabulous convention not to be missed! Your membership in the ACA will offer so much more, such as participation in the Paul V. Loiselle Conservation Fund, cichlid research through the Guy D. Jordan Endowment Fund, hands-on cichlid conservation through ACA C.A.R.E.S., a speaker program, a Club Liaison Program, special awards, and an up-to-date, informative ACA website at **www.cichlid.org**

American Killifish Association

The American Killifish Association (AKA) is dedicated to the propagation, study, and conservation of killifish. Enjoy the benefits as a member. Membership is $26 per year and includes six issues of the Journal of the American Killifish Association and monthly issues of the Business Newsletter, which gives members the opportunity to obtain and sell killifish. Members are also given access to the members-only section of the website. The AKA hosts many events during the year, including the big Memorial Day Weekend convention and affiliate club shows, which occur all year long. Log on to **www.aka.org** for more information.

American Livebearer Association

The American Livebearer Association (ALA) offers bi-monthly publications, species maintenance programs, access to various types of livebearers, an annual convention, special publications, slides, and more. For more information, visit **www.livebearers.org**

The Angelfish Society

The Angelfish Society (TAS) is a collection of angelfish enthusiasts, hobbyists, and breeders who are interested in the advancement of our hobby through improvements in the quality of the fish we keep and breed by employing the standard which this society will develop. TAS is dedicated to the enhancement of the angelfish through high-quality breeding programs using standards established by the society. Informative online chatroom meeting schedules can be found at **www.theangelfishsociety.org.** Membership is $5 annually, which includes the quarterly FinTAStic newsletter.

Aquatic Gardeners Association

Membership in the Aquatic Gardeners Association includes a full-color quarterly journal with informative articles for beginners and advanced hobbyists alike. Dues are $20 per year (US, Canada, Mexico), $23 all other countries (multiyear discounts available). AGA also sponsors an annual online aquascaping contest and a biennial convention. For more information, visit **www.aquatic-gardeners.org.**

The Canadian Association of Aquarium Clubs

The Canadian Association of Aquarium Clubs (CAOAC) is a non-profit association of aquarium, herptile, and pond clubs from across Canada and New York State. Some of the things we offer are: a national awards program to honor those in member clubs who have achieved success in breeding, plant propagation, or other endeavors related to the hobby; a Fish Rescue Program to help those hobbyists with large or unwanted fish to find new homes for them; and a chance to become involved with people who share similar interests. Please visit our website at **www.caoac.ca** for more information.

East Coast Aquarium Society

The East Coast Aquarium Society is the largest and fastest-growing aquarium club in Atlantic Canada. ECAS actively promotes and encourages aquatic education of freshwater and marine aquaria, aquatic plants, and other related livestock in a fun and informative learning environment. Benefits and privileges of joining include discounts from sponsors and local vendors, auctions and fish shows, and shopping nights at local fish stores. Members also join programs such as the Breeders Award Program (BAP) and the Horticulturalist Award Program (HAP), which offer hobbyists rewards for species breeding and plant propagation. Also held are monthly socials and chat nights. For more information, visit **www.eastcoastaquariumsociety.ca**

East Coast Cichlids

East Coast Cichlids is an active and friendly group of hobbyists who support each other in the breeding, raising, and care of all fish (not just cichlids). Fun, monthly events are held and online support is always available. Come see what the "buzz" is about! FREE membership! Join us for fish, fun, and friendship! **www.eastcoastcichlids.org**

Great Lakes Cichlid Society

Join one of the Midwest's top cichlid clubs now celebrating its 20th year in progress. Members come from all states surrounding the Great Lakes area and throughout the nation. The club meets on the fourth Friday of every month, excluding July, 8 p.m. at the Masters Church (771 east 260th St. Euclid, Ohio, 10 minutes east of downtown Cleveland). There are local and national speakers monthly, raffles, breeder award programs, refreshments, and great fish talk. For more information visit **www.GreatLakesCichlidSociety.net**

International Betta Congress

Founded in 1966, the International Betta Congress (IBC) is a nonprofit worldwide organization promoting the breeding, raising, and study of bettas. IBC actively promotes the selective breeding of various color and finnage strains of bettas through the Sanctioned Show program, where fish are exhibited and judged in pre-defined classes. Our bi-monthly bulletin FLARE! contains articles written by our members and is geared toward the beginner as well as the advanced hobbyist. We have a June Annual Convention hosted by one or more IBC chapters (smaller local groups of betta hobbyists within IBC). As a member of IBC you can join our members-only forum, a free service where you can send and receive group messages, share photos, access IBC-related files, and much more. For further information visit the IBC official website, **www.ibcbettas.org**

International Fancy Guppy Association

The International Fancy Guppy Association (IFGA) is an organization for guppy breeders and hobbyists interested in breeding and showing fancy guppies. A monthly publication is available and many shows with over 40 color/tail-shape classes are held throughout the country yearly. For more information visit **www.ifga.org**

Mid-Atlantic Cichlid Keepers

The Mid-Atlantic Cichlid Keepers (M.A.C.K.) is a group of amateur aquarists whose main interest is the breeding, raising, and management of cichlids. Monthly meetings are held from September to May on the 3rd Friday of each month, at 8 p.m. (doors open at 7:30 p.m.), in the Springfield Town Hall building, 50 Powell Road Springfield, PA 19064. For further information, email membership@mackattack.org or visit **www.mackattack.org**

Mid-Atlantic Koi Club

An active and friendly club for people who are interested in the study and enjoyment of koi, goldfish, and outdoor ponds. Monthly meetings provide a variety of activities, including lectures, pond tours and koi shows, as well as an opportunity to meet other enthusiasts. For information email members@makc.com or visit **www.makc.com**

The Midwest Cichlid Association

The Midwest Cichlid Association (MCA) is a new and exciting organization, dedicated to the promotion of keeping, breeding, and specialization of the cichlid fish hobby. We eat, sleep, and breathe cichlids! If you would like more information about The Midwest Cichlid Association, please email us at Contact@MidwestCichlid.com or visit **www.midwestcichlid.com**

North American Discus Association

The North American Discus Association (NADA) is a non-profit organization of discus enthusiasts, hobbyists, and breeders. Our goal is to educate the general public, encourage new members, provide information on the hobby, and promote discus at fish shows. We offer a quarterly newsletter. Please visit our website at **www.discusnada.org** for more information.

The North American Native Fishes Association

The North American Native Fishes Association (NANFA) is a not-for-profit, tax-exempt corporation dedicated to the appreciation, study, and conservation of the continent's native fishes. The organization seeks to increase and disseminate knowledge about North America's native fishes and their habitats, and to promote the conservation of native fishes and the protection/restoration of natural habitats. It also looks to advance the captive husbandry of North America's native fishes for the educational, scientific, and conservation benefits it affords. For more information, visit **www.nanfa.org**

Northeast Council of Aquarium Societies

The Northeast Council of Aquarium Societies is a group of aquarium societies in the northeast, where we share information about running an aquarium society and generally bring all members of each of our clubs together. The NEC sponsors an annual general tropical fish convention in March or April each year. **www.northeastcouncil.org/nec/**

Northwest Killies Club

The Northwest Killies Club (NWK) is an affiliate club of the American Killifish Association. Our intent is to represent the interests of killifish keepers of the Pacific Northwest and beyond. Membership is open to all. Our members are widely scattered, living in various parts of Oregon, Washington, and as far away as Utah. For that reason, we call ourselves a "virtual club," using e-mail to keep in regular contact and meeting physically only four times a year. We also publish a quarterly newsletter. For more information, visit **http://nwk.aka.org**

The Pacific Coast Cichlid Association

Now celebrating its 20th year, the Pacific Coast Cichlid Association (PCCA) meets in San Jose, CA the second Saturday of each month. Meetings feature a presentation (past speakers have included Dr. Paul V. Loiselle and Ad Konings) with an auction and raffle following. For more information, write to: PCCA P.O. Box 28145t, San Jose, CA 95159-8145 or visit **www.cichlidworld.com**

Quad City Fish Keepers

Serving the Mississippi Valley region of Eastern Iowa and Western Illinois. All are welcome from the beginner to the advanced hobbyist, fresh or salt **www.qcfishkeepers.com**

ARIZONA

Arizona Aquatic Plant Enthusiasts

Meets every third Sunday of the month. See forum for additional details. **www.azaquaticplants.com**

Arizona Rivulin Keepers

Meets monthly (usually on the second Saturday), 7:00 p.m., Denny's Restaurant, 4403 S. Rural Road, Tempe, AZ. **www.ark.aka.org**

Dry Wash Aquarium Society

Meets the second Thursday of the month, American Legion Post 105 at 3534 W. Calavar Rd. in Phoenix, AZ at 7 p.m. **www.drywashaquarium.org**

ARKANSAS

NE Arkansas Reef Club

Meets irregularly, but always available for online support, especially for beginners, and to share wealth of reefkeeping knowledge. **www.nea-reefkeeping.com**

Northwest Arkansas Aquarium Society (NWAAS)

Contact: (479) 359-0088 - Meets the second Saturday of each month, 7 p.m., at the Rogers Police Department Community Room in Rogers, AR. General interest club, everyone welcome! **http://nwaas.com**

CALIFORNIA

California Betta Society

Afternoon meetings on the fourth Saturday of each month. Check website for location and contact information. **www.cbsbettas.org**

COAST Club

Meets 1 to 5 p.m., the first Sunday of each month, the Costa Mesa Neighborhood Community Center, Victoria Room, 1845 Park Avenue, Costa Mesa, CA. **www.coastfishclub.com**

Golden State Bettas

Meets bimonthly at various locations throughout Southern California. Visit the website for more information. **www.goldenstatebettas.com**

LAFishFanatics

This freshwater fish club meets in the San Fernando Valley, the last Sunday of each month. Contact: 818-370-6930 or email **lafishfanatics@hotmail.com**

The Marine Aquarium Society of Los Angeles County

Meets the second Friday of every month, Denny's Restaurant, 3060 San Fernando Road in the Los Angeles area, 7 p.m. **www.maslac.org**

Sacramento Aquarium Society (SAS)

Meets on the first Saturday of each month at 7 p.m. at Round Table Pizza (9500 Greenback Lane) in Folsom. **www.sacramentoaquariumsociety.org**

San Diego Marine Aquarium Society

Monthly meetings are held on the second Wednesday of every month. Visit the website for locations. **www.sdmas.com**

San Diego Tropical Fish Society

Meetings the second Sunday of every month, 7 p.m., Room 101 of Casa del Prado, Balboa Park. **www.sandiegotropicalfish.com**

San Francisco Aquarium Society

Meetings are 6:30 p.m., the first Friday of every month, and are free and open to everyone. **www.sfaquarium.org**

Silicon Valley Aquarium Society

Meets are every first Saturday, 6:30 p.m., Round Table Pizza, 4302 Moorpark Ave., San Jose, CA (Rt. 280 & Saratoga Ave.). **http://siliconvalleyaquariumsociety.com**

Southern California Reef Keepers

Meets at 2642 Cherry Ave. in Long Beach every 3rd Sunday of the month from 6 to 9 p.m. Contact Tana Hsu at 310-930-5537 or visit **www.scrk.org**

COLORADO

The Colorado Aquarium Society

General meetings the first Friday of each month, 7:30 p.m., St. James Episcopal Church, 8235 W. 44th Ave., Wheat Ridge, CO.

Rocky Mountain Cichlid Association

Meets September through June, 6 p.m., the second Sunday of the month, the Englewood Recreation Center, 1155 W. Oxford Ave., Denver, CO (1/2 mile south of Hampden and one block east of Santa Fe Ave.). **www.rmcichlid.org**

CONNECTICUT

Connecticut Area Reef Society

Meets monthly at various spots throughout the state, typically the third or fourth Sunday of the month. **www.ctars.org**

Greater Hartford Aquarium Society

Meets 7:30 p.m. on the fourth Tuesday of every month at the Lutz Children's Museum, 247 South Main Street, Manchester, CT. **www.ghasct.org**

The Norwalk Aquarium Society

Meets the third Thursday of every month (except July and December), Earthplace, 10 Woodside Lane, Westport, CT. **www.NorwalkAS.org**

DELAWARE

Delaware Reef Club

Meets the third Monday of every month, 7:00 p.m., at the William Penn High School's main cafeteria in New Castle, DE. **www.delreefclub.org**

Diamond State Aquarium Society

Meets on the second Monday of each month of the school year, September thru May, at 7:30 p.m. at William Penn High School, 713 E. Basin Road, New Castle, DE 19720. **http://dsas.topcities.com**

FLORIDA

Coastal Aquarium Society

Meets at the Pritzker Marine Biology Research Center at the New College of Florida the first Wednesday of each month at 7:30 p.m. For more information, visit **http://coastalaquariumsociety.com.**

Gold Coast Aquarium Society of South Florida

Monthly meetings with presentations, raffles, and auctions. Details and forum at website. **www.goldcoastaquarium.org**

Southwest Florida Marine Aquarium Society

Meets on the third Saturday of each month at 3:30 p.m. at The Imaginarium, 2000 Cranford Avenue, Fort Myers, FL (unless otherwise noted on the club website). **www.swfmas.com**

Space Coast Reef Club

Meets the first Wednesday of each month at 7 p.m. at the Space Coast of Florida. **www.spacecoastreefclub.com**

Tampa Bay Aquarium Society

Meets the 2nd Monday of every month at the Florida Aquarium, 701 Channelside Drive, Tampa, FL. Doors open at 7:00 p.m., and the meeting starts at 7:30 p.m. **www.tbas1.com**

GEORGIA

Atlanta Area Aquarium Association

Meets the first Sunday of every month at 1:30 p.m. in Room 101 of White Hall on the campus of Emory University. **www.atlantaaquarium.com**

Southeast Georgia Reef Club

Meets on third Tuesday of the month at Shoney's Restaurant in Waycross, Georgia at 7 p.m. **www.sgreefclub.com**

HAWAI'I

The Big Island Aquarium Society

Meets the first Friday of every month, the Komohana Agricultural Complex, Hilo, HI, 7 p.m. Contact: Ricky K. Ogata, P.O. Box 6807, Hilo, HI 96720, **kazuor@interpac.net**

The Honolulu Aquarium Society

Meets the first Friday (except holidays) of each month, 7p.m., the Kuhio Elementary School Cafetorium, 2759 South King Street, Honolulu, HI. **www.honoluluaquariumsociety.org**

ILLINOIS

Central Illinois Tropical Aquarium Club

Meets the second Sunday of each month. Please visit the centralillinoistac Yahoo! Group or email **david@davidzink.com** for more information.

Champaign Area Fish Exchange

Meets the first Saturday of the month (second Saturday for holiday weekends, and no meeting in January or July) at 1125 Plant Sciences Laboratory, 1201 S. Dorner Drive Urbana, IL 61801. For more info, contact Jerry Montgomery at 217-359-6707 or email **champaignfishguy1@yahoo.com.**

Chicago Killifish Association

Meets the third Saturday bimonthly at the Holiday Inn Select, 1801 N. Naper Blvd., Naperville, at 2 p.m. **www.aka.org/chika**

Chicago Livebearer Society

Meets four to six times per year. **www.chicagolivebearer.com**

The Chicagoland Marine Aquarium Society

Meets the second Saturday of each month, 1 p.m., Devry University, 1221 N. Swift Rd., Addison, IL (unless otherwise noted). **www.cmas.net**

Greater Chicago Cichlid Association

Meets 7 p.m., the second Sunday of each month, the Holiday Inn Rolling Meadows, close to I-90 & I-290/53. **www.gcca.net**

The Green Water Aquarist Society of Chicagoland

Meets the first Friday of each month (except July and December), 7:30 p.m., the Alsip Village Hall, 4500 W. 123rd Street, Alsip, IL. **www.gwasoc.org**

INDIANA

Circle City Aquarium Club

Meets the first Thursday of each month at 7:30 p.m. at Stonegate Early College High School, 2855 N. Franklin Road, Indianapolis, Indiana. For more information, call Hedy at 317-255-0121, email **ranchu2@juno.co**

Indy Cichlid Club

The ICC holds monthly meetings where members can meet and discuss the latest information in the hobby. Contact indycichlidclub@gmail.com. **www.indycichlidclub.com**

Michiana Aquarium Society

Meetings the third Sunday of each month, Jan.-Nov. (second Sunday in June), 6 p.m., the Roseland Town Hall, 200 Independence Dr., Roseland, IN. **www.michianaaquariumsociety.org**

IOWA

Greater Iowa Reef Society

Reefkeepers' club sharing years of knowledge for success! Monthly meetings include conferences, tank tours, DIY workshops, coral trading, group discounts, guest speakers, and raffles. Save money and find success! **www.greateriowareefsociety.org**

Iowa Aquaria Association

Meets quarterly, the first Saturday of February, May, August, and November. **www.iowa-aquaria.com**

KANSAS

The Heart of America Aquarium Society

See the Heart of America Aquarium Society listing under Missouri.

Wichita Aquarium Club

Please visit the website for meeting information. **www.wichitaaquariumclub.com**

KENTUCKY

Louisville Marine Aquarium Society

Meetings usually the third Sunday evening of the month. **www.LMAS.org**

LOUISIANA

Southeast Louisiana Aquarium Society

Check our website for meeting times and locations. **www.selas.us**

MARYLAND

The Capital Cichlid Association

Meetings the second Saturday of every month, 2 to 4 p.m. **www.capitalcichlids.org**

MASSACHUSETTS

The Boston Aquarium Society

Meets the third Monday of each month, 7:30 p.m, New England Aquarium, The Exploration Center, Central Wharf, Boston, MA. **www.bostonaquariumsociety.org**

New England Fancy Guppy Association

Typically meets the third Sunday of the month at 1 p.m. Email laurasminskins@comcast.net or check the website for more information. **www.newenglandguppies.org**

The Pioneer Valley Aquarium Society

Meets the first Tuesday of each month from September through June, the Captain Charles Leonard House, 663 Main Street, Agawam, MA, 7 p.m. **www.pvas.net**

MICHIGAN

Grand Valley Aquarium Club

Located in Grand Rapids, MI. Meets the second Saturday of each month, 7 p.m., after a half-hour social period, the Holiday Inn Express, 6569 Clay Ave SW, just off Highway 131, at the 68th street exit. **www.grandvalleyaquariumclub.org**

The Greater DetroitAquarium Society

Meets the fourth Wednesday of every month (unless otherwise noted), the Good Shepherd Lutheran Church, 814 North Campbell Road, halfway between 11 and 12 Mile Road, Royal Oak, MI, 8 p.m. **http://greaterdetroitaquariumsociety.org**

Michigan Aquatic Plant Group

Check forum for meeting times and locations. **www.miapg.com**

Motor City Aquarium Society

Meets the second Thursday of every month, St. Gertrude's Religious Education Building, 28839 Jefferson St., Clair Shores, MI, north of Martin Rd. (11 1/2 Mile Rd.) near the Blue Goose Restaurant. Enter from the back of the building. Doors open 7:30 p.m. **www.motorcityaquariumsociety.com**

Southwestern Michigan Aquarium Society

Meets at 8 p.m. on the first Friday of each month at Kalamazoo Valley Community College's Advanced Technology Center, at 6767 West "O" Avenue in room 5830, in Kalamazoo, MI. **www.swmas.org**

MINNESOTA

Minnesota Aquarium Society

Meets the first Thursday of every month (except July) at King of Kings Lutheran Church at 2330 N. Dale St., Roseville, MN 55113. Meetings begin promptly at 7:30 p.m. **www.aquarium.mn**

MISSOURI

Heart of America Aquarium Society of Kansas City

Meets the second Saturday of the month at Bridge View Hall in North Kansas City. **http://kcfishclub.org.**

The Missouri Aquarium Society

Meets the third Thursday of each month, 7:30 p.m., the Dorsett Village Baptist Church, 2240 Bennington Place, Maryland Heights, MO 63043. **www.missouriaquariumsociety.org**

Saint Louis Area Saltwater Hobbyists

See website for meeting dates and time. **www.slashclub.org**

NEW HAMPSHIRE

The New Hampshire Aquarium Society

Meets the second Wednesday of every month, September through June, 7 p.m., Somersworth, NH High School/Vocational School. **www.nhaquariumsociety.com**

NEW JERSEY

Jersey Shore Aquarium Society

Meetings the second Monday of the month, Knights of Columbus Hall, 70 E. Main St. (Rt. 537), Freehold, NJ, around 8 p.m. **www.jerseyshoreas.org**

The Metropolitan Area Killifish Association

Meets the fourth Wednesday of the month (third Wednesday in November and December), the Meadowlands Environment Center, Lyndhurst, NJ. **www.aka.org/maka**

New Jersey Tri-State Tropical Fish Association

Meets monthly, 7 p.m., the Barrington Municipal Building, 229 Trenton Avenue, Barrington, NJ. Contact: Bill Farrell, President, at 856-428-1431 or **fish4thought0321@aol.com**

North Jersey Aquarium Society
Meets every third Thursday of the month (except August and December) at the Lyndhurst Elks Club, 251 Park Avenue, Lyndhurst, NJ 07071. Doors open at 7:00 p.m.; meeting starts promptly at 7:45 p.m. **www.njas.net**

The South Jersey Guppy Group
Meets the third Sunday of each month, 1 p.m., the Griggstown Firehouse in Princeton, NJ. Contact: Dave Polunas at 732-329-9597 or email **daveguppy@aol.com**

NEW YORK

Brooklyn Aquarium Society
Meets the second Friday of the month, 7:30 p.m., the New York Aquarium's Education Hall, Coney Island, Surf Ave. and West 8th St., Brooklyn, NY. **www.brooklynaquariumsociety.org**

Capital District Marine Aquarist Society
Meetings are informal and held once per month at a volunteering member's home. **www.cdmas.org**

Central New York Aquarium Society
Meets 7 p.m., the third Wednesday of every month (except July and August), at the Dewitt Community Center, 148 Sanders Creek Pkwy, East Syracuse, NY. **www.cnyas.org**

Danbury Aquarium Society
Meets the fourth Friday of each month (except July and December), 8 p.m., the Carmel Ambulance Corps, Vink Road, Carmel, NY. **www.northeastcouncil.org/daas**

The Greater City Aquarium Society
Meets the first Wednesday of each month (except January and February), the Queens Botanical Garden, Queens, NY 7:30 p.m. **www.greatercity.org**

Hudson Valley Reefkeepers
Group meets monthly at a member's home. Visit the events section of the website for more information. **www.hvreef.org**

Long Island Aquarium Society
Meetings are the third Friday of every month (except July and August) at 8 p.m. at Stony Brook University. **www.liasonline.org**

Long Island Reef Association
Meets the first Friday of the month. See website for location and speaker. **www.longislandreef.org**

Nassau County Aquarium Society
Meets the second Tuesday of the month (except July & August). **www.ncasweb.org**

NORTH CAROLINA

Raleigh Aquarium Society
Meets the first Thursday of each month, the North Carolina State University School of Veterinary Medicine; downstairs, across from the library; 7:30 p.m. **www.raleighaquariumsociety.org**

Reef Aquarium Society of Charlotte
Meets every third Saturday of the month, 2 to 4 p.m. **www.rasoc.org**

Western North Carolina Aquarium Society
Meets from 7 to 9 p.m. on the third Thursday of every month in the Aquarium & Planetarium Building at the Catawba Science Center, located at 243 3rd Ave. NE in Hickory, NC 28603. Freshwater and saltwater aquarium enthusiasts welcome. Contact: Scott Arney at **cichlidz1@aol.com**

OHIO

The Cleveland Aquarium Society
Meets the first Tuesday of the month, the Cleveland Zoo educational building, just inside the main gate, 8 p.m. **www.clevelandaquariumsociety.org**

Columbus Area Fish Enthusiasts (CAFE)
Meets bimonthly in Columbus, OH. **www.columbusfishclub.org**

The Greater Akron Aquarium Society
Meets the first Thursday of each month, the Tallmadge Community Center, 80 Community Drive, Tallmadge, OH. **www.gaas-fish.net**

The Greater Cincinnati Aquarium Society
Meetings the last Sunday of the month (may vary with speaker and event schedules), 7:30 p.m., the Winton Woods Visitor's Center, 10245 Winton Road, Cincinnati, OH 45231. **www.gcas.org**

Medina County Aquarium Society
An all-species club located in Medina, OH. See website for meeting dates and times. **www.mcas-fish.net**

The Ohio Cichlid Association
Meets the first Friday of every month (except July, because of the ACA convention), the Old Oak Bible Church, 7575 Old Oak Blvd., Middleburg Hts., OH (north of Fowles Road). Doors open 7:30 p.m., meeting promptly at 8 p.m. **www.ohiocichlid.com**

Stark County Aqua Life Enthusiasts Society
Meets the third Sunday of every month at the Perry Grange Hall, 6300 Richville Dr. SW., Massillon, OH 44646. Meetings are from 5 p.m. to 7:30 p.m. For more information, contact John or Theresa Baad at 330-452-9027, or visit the website. **www.scalesclub.com**

Youngstown Area Tropical Fish Society
Meetings the third Friday of each month, the Presbyterian Church, Mineral Ridge, OH, 7:30 pm. **www.yatfs.com**

OKLAHOMA

Oklahoma Aquarium Association
Statewide organization with chapters in Tulsa, Stillwater, and Oklahoma City. Meets monthly. For more details, call 405-263-4769 or visit the website. **www.theokaa.org**

OREGON

The Greater Portland Aquarium Society
Meets the fourth Tuesday of each month, 7 p.m., the Fellowship Masonic Center, the corner of 57th and Sandy, Portland, OR. **www.gpas.org**

PENNSYLVANIA

The Aquarium Club of Lancaster County
Meets the third Saturday of each month except July and August. For more information, visit **www.aclcpa.org.**

The Bucks County Aquarium Society
Meets the first Thursday of every month, the Churchville Nature Center, Churchville, PA, 7:30 p.m., doors open 7 p.m. **www.bcasonline.com**

The Delaware County Aquarium Society
Meets the first Friday of every month, except July and August, the Springfield Municipal Building, Springfield (Delaware County), PA. Doors open 7:30 p.m., meeting at 8 p.m. **www.dcas.us**

Erie Aquarium Society of Erie Pennsylvania
Contact: Erie Aquarium Society, P.O. Box 8025, Erie, PA 16505. Meets 7:30 p.m., the second Wednesday of each month, the West Ridge Fire Station, 3142 West 26th Street (Route 20) & Homer Avenue, Erie, PA 16506. **http://groups.yahoo.com/group/erieaquariumsociety**

Greater Pittsburgh Aquarium Society
Regular meetings usually the last Friday of the month, the Phipps Garden Center, corner of Fifth Ave. and Shady Ave. (Mellon Park). Doors open 7 p.m., meeting at 7:30 p.m. **www.gpasi.org/index.html**

Mason Dixon Reef Club
Also serving Maryland; all meetings open to public. Check our website for times and locations. **www.mdreefclub.com**

Pennsylvania Fish Culturist Association
Meets the second Thursday of every month (except July and August), 7:30 p.m., Lawncrest Recreation Center, 6000 Rising Sun Avenue, Philadelphia, PA 19111. Contact: Bill: 856-428-1431, or e-mail: **farfish403@aol.com**

The Philadelphia Area Reef Club
Meetings the first Wednesday of each month, the Katherine Drexel Library, 11099 Knights Rd., Philadelphia, PA 19154. Contact: **p.a.r.c@home.com**

Pittsburgh Area Planted Aquarium Society
Dedicated to planted aquaria. Meetings are typically held at 2:00 p.m. on the first Sunday of the month at A and B Oddball Pets and Aquariums, 262 Joseph St., Pittsburgh, PA. **www.homeofpapas.org**

RHODE ISLAND

Tropical Fish Society of Rhode Island
Meetings are the third Wednesday of the month at 7:30 p.m. (no meeting in December). Meetings are held at the Rhode Island Society for the Prevention of Cruelty to Animals (RISPCA) at 186 Amaral St., Riverside, RI 02915. **www.tfsri.net**

SOUTH CAROLINA

Columbia Marine Aquarium Club
For location and meeting times, visit the website. **www.columbiamac.org**

Palmetto Marine Aquarium Club
For meeting times and location, visit **www.palmettomac.com.**

TEXAS

Dallas Marine Aquarium Society
Meetings are held on the second Saturday of each month. Visit the website for more information. **www.dallasmas.org**

Dallas-Ft. Worth Marine Aquarium Society
Meetings every third Wednesday of the month, around the DFW Metroplex. **www.DFWMAS.com**

Dallas Killifish Association
Meets the first Saturday of the month at 6 p.m. Check website for date and location. **www.dallaskillifish.com**

Greater Houston Aquarium Club
Meets at a member's home on the third weekend of each month. Visit the website for time and location, or contact stevecgg@myghac.org. **www.myghac.org**

The Hill Country Cichlid Club
Serving the I-35 corridor including Austin, San Antonio, and the rest of the Texas Hill Country. **www.hillcountrycichlidclub.com**

Houston Aquarium Society
Meets the fourth week of the month, varying locations. **www.houstonaquariumsociety.org**

Texas Cichlid Association
Meetings the third Saturday evening of each month. **www.flash.net/~tcichlid**

UTAH

The Great Salt Lake Aquarium Society
Meets the second Thursday of each month at the Garden Center, Sugarhouse Park, 1601 E. 2100 Street, Salt Lake City, UT. Doors open 7 p.m., programs, 7:30 p.m. **www.gslas.com**

Utah Marine Aquarium Society
Meetings held at the Living Planet Aquarium on the third Thursday of every month. **www.utmas.com**

Wasatch Marine Aquarium Society
Meetings the first Thursday of each month. **www.utahreefs.com**

VERMONT

Otter Valley Aquarium Society
Meets the second Tuesday of the month at 7:30 p.m. (except July & August) at the Maclure Library in Pittsford, Route 7 North. **jtoddybas@aol.com**

Tropical Fish Club of Burlington, VT
Meets monthly September through June, the second Thursday of the month, at the VFW, 73 Pearl St, Essex Junction, VT. **www.tfcb.org**

Vermont Marine Aquarists
Meets quarterly when there is interest. Contract erik.engstrom@gmail.com for more information. **www.saltwatervt.org**

VIRGINIA

Potomac Valley Aquarium Society
Meets the first Saturday of each month at the Green Acres School, 4401 Sideburn Road, Fairfax, VA. Doors open 12:30 p.m., meeting begins at 1:00 p.m. **www.pvas.com**

Shenandoah Valley Aquarium Club
Meetings are held on the last Sunday of each month from 4 p.m. until 5 p.m. at the Burger King in Verona, VA. For more information, check www.svac.co and our **Facebook page (Shenandoah Valley Aquarium Enthusiasts).**

WASHINGTON

Greater Seattle Aquarium Society
Meets the second Tuesday of every month, except July and August. Plant auction in February, big auction in April. **www.gsas.org**

Inland Northwest Aquarium Society
Meets the first Wednesday of every month, 7 p.m., Aquarium Solutions, 9516 E. Montgomery Ave, Ste. 18, Spokane Valley, WA. **www.inwas.org**

Seattle Saltwater Fish Association
Meets biweekly in west Seattle, Washington. Contact: Kristine at 206-935-3212 or email **kvillager@gmail.com**

WASHINGTON D.C.

The Chesapeake Marine Aquaria Society
Meets monthly in the Greater Washington/ Baltimore area. See website for more details. **http://www.cmas-md.org**

WISCONSIN

Central Wisconsin Aquarium Society
Meets at least once monthly, and auctions (spring and fall), shows (before fall auction), and other outings are held. **www.cwas.org**

Green Bay Aquarium Society
Meets the second Wednesday of each month at the home of a club member. **http://www.gbasonline.org**

Madison Area Aquatic Hobbyists
Meets monthly on the third Saturday of the month. **http://madisonaquatichobby.com**

The Milwaukee Aquarium Society
Meets the third Friday of every month (except July and December), Hoffer's Tropic Life Pets, 7323 N. 76th St., Milwaukee, WI. **www.milwaukeeaquariumsociety.com**

Sheboygan Aquatics Society
Meets the second Wednesday of each month. For more information, visit **www.sheboyganaquaticssociety.org.**

AUSTRALIA

Australia New Guinea Fishes Association
Contact: membership@angfa.org.au, PO Box 673, Ringwood Vic 3134, Australia. **www.angfa.org.au**

CANADA

The Aquarium Society of Winnipeg
Meets every third Sunday, September through June, theatre 100 at St. Paul's College, University of Manitoba, 70 Dysart Road. **www.asw.ca**

Association Regionale des Aquariophiles de Quebec
Meets 7:30 p.m. on the second Monday of every month at 2125 Louis-Jolliet, Quebec, QC. **www.araq.org**

Brant Aquarium Society
Monthly meetings are held on the second Wednesday of each month, September to June, at TB Costain Community Centre at 12 Morrell St., Brantford, Ontario. **www.brantaquariumsociety.ca**

Calgary Aquarium Society
Meets the second Tuesday of each month. Visit the website for time and location. **www.calgaryaquariumsociety.com**

Canadian Killifish Association
Meets monthly, the second Sunday, 1 p.m. Location changes month to month. **www.cka.org**

The Canadian Rift Lake Cichlid Association
Quarterly meetings, the University of Guelph, Arboretum Nature Centre in Guelph, Ontario. **www.crlca.com**

Durham Region Aquarium Society
Monthly meetings, the second Tuesday of each month, 7:30 p.m., Anderson Collegiate, 400 Anderson St., Whitby, Ontario. **www.dras.ca**

East Coast Aquarium Society
Based in Halifax, Nova Scotia. Monthly meetings from September to June. **www.EastCoastAquariumSociety.ca**

Hamilton & District Aquarium Society
Meets on the second Thursday of every month at 7:30 p.m. (except July and August) at the Church of the Resurrection, located at 435 Mohawk Road West, Hamilton, Ontario. **www.hdas.ca**

Kitchener Waterloo Aquarium Society
Meets the first Tuesday of every month (except July and August). **www.kwas.ca**

The London Aquaria Society
Based in London, Ontario, Canada. Meetings the second Tuesday of every month, 7:30 p.m., except July and August. **www.londonaquariasociety.com**

Montreal Aquarium Society
Meets the second Wednesday of each month, except in July and August. **www.themontrealaquariumsociety.com**

Ottawa Valley Aquarium Society
Meetings are the fourth Monday of every month (except July, August, and December) at 7 p.m. at the Mel Baker Hall of J.A. Dulude Arena at 941 Clyde Avenue, Ottawa, Ontario. **www.ovas.ca**

Peel Regional Aquarium Club
Meetings the third Thursday of the month, September to June, 7 p.m, Turner Fenton Secondary School, 7935 Kennedy Road South. **www.peelaquariumclub.org**

Saskatoon Aquarium Society
Meets at the Calvin-Goforth Presbyterian Church at 1602 Sommerfeld Ave. (corner of 3rd and Sommerfeld) on the last Sunday of each month at 1:30 p.m. **www.saskatoonaquarium.com**

The St. Catharines & Area Aquarium Society
Meets every third Thursday of the month (except August and December) at The Seafarers and Teamsters Union Hall, 70 St. David's Rd. E., Thorold, ON. Doors open at 7:00 p.m.; meeting starts promptly at 7:45 p.m. Visit us at our website or call 732-541-1392. **www.scaas.info**

Sarnia Aquarium Society
Meets 7:30 p.m., the second Tuesday of each month, the British Canadian Club, 375 Vidal Street South., Sarnia, Ontario, Canada. **www.sarniaaquariumsociety.com**

Société d' Aquariophilie de Montréal (S.A.M.)
Meetings are on every third Tuesday of the month, except July and August, held at 75 Sir Georges-Etienne Cartier in Montreal, Canada; events include conferences, breeder awards, and auctions. **www.aquasam.qc.ca**

Toronto Willowdale Aquarium Society (TWAS)
Serving the megacity of Toronto. For more information, email us at info@torontoaquarium.org or visit **www.torontoaquarium.org**

Vancouver AquaticHobbyist Society
See website for meeting times and contact information. **http://vahs.ca**

Wet Coast Aquarium Society
Meets the second Monday of the month at 7:30 p.m. at The University of British Columbia. **http://wetcoastaquariumsociety.ca**

INDIA

Indian Aquarium Hobbyist Portal
Dedicated to aquarists of India, bringing them together, addressing lack of specific information in the hobby and providing useful resources. **www.iah.in** or visit us at our website **www.indianaqariumhobbyist.com**

ITALY

Club Ittiologico Romano "Giancarlo Iocca"
Meets the last Thursday of each month. Visit the website for time and location. **www.cir.roma.it**

The Gruppo Acquariofilo Salentino
Please visit website for meeting times and other information. **http://www.gas-online.org**

MEXICO

Comunidad Acuariofila Regiomontana
An association dedicated to the study, conservation, and propagation of all fishes, plants, and other aquatic life. Located in Monterrey, Nuevo León, Mexico. Annual membership is $15. Meets every second Saturday of each month at 3:00 p.m. Mail us at info@carac.com.mx for additional information or visit **www.carac.com.mx**

PUERTO RICO

Aquarists Metro East of Puerto Rico
Meets in San Juan, every first Saturday, 1:30 p.m., Interamerican University Metro, 426. **www.amepr.org**

Asociación de Acuaristas de Aguadilla
Meets every second Sunday at 1:30 p.m. at Esc. Esther Feliciano de Mendoza, Ramey Base, Aguadilla, PR. Contact: camatos99@yahoo.com **www.aaapr.org**

If your club would like to be included in "Meeting Place," please contact Tsing Mui at tmui@tfh.com

aquarium society news

Kevin T. Adams

Marine Aquarium Expo

The Marine Aquarium Expo (MAX) celebrated its five-year anniversary on March 31–April 1, 2012 at the Orange County Fair & Event Center in Southern California. We were more than pleased with the outcome. People of all ages and backgrounds filled the aisles excitedly, checking out all the latest and greatest offerings on display by our exhibitors. For those looking to purchase livestock, there were more than two dozen vendors selling fish, inverts, and coral frags of every variety.


Kevin Adams

The fifth annual Marine Aquarium Expo (MAX) attracted reef hobbyists from all over the nation.

Our famous MAX "FinZone" and the 8-foot Touch Tank did it again! It intrigued not only our young attendees but adults and seniors alike. This year, for the first time in three years, our Touch Tank livestock sponsor, Segrest Farms, exhibited at MAX and, needless to say, was quite impressed. What's really impressive is that there were more curious adults and seniors at the FinZone than ever before. We actually witnessed a child showing her mother what a horseshoe crab looks like—that's pretty remarkable!

There were over 100 exhibitors (manufacturers, wholesalers, and retailers), attracting over 3,000 attendees during the MAX two-day event. The atmosphere was buzzing with excitement and jubilance from all attendees and exhibitors alike. One reason our attendees were so excited was our opportunity drawing Grand Prize. This year, Red Sea generously donated the MAX 250—a plug-and-play 66-gallon coral reef aquarium. We are grateful to Red Sea for their donation and their commitment to this hobby.

The latest MAX also proudly introduced its newest addition to the show, the MAX HD Movie Theater! Full-feature animated movies, such as *Finding Nemo* and *The Little Mermaid*, screened every two hours during the day. This feature of the show was definitely a hit with parents who could treat their child to a movie while their significant other freely perused the show. Of course, there was plenty of entertainment outside the theater too with balloon artists, face painting, pirate and mermaid characters, and even a paper airplane flight contest! Given the praise, comments, and feedback that we have received from our attendees, we are quite pleased with the results!

Sunset Promotional Services, Inc. has been in production for a little over five years and now has seven aquatic shows under its belt. We had an impressive lineup of guest speakers this year, most with standing room only. We certainly appreciate all of the knowledgeable and educational speakers who participated in MAX 2012 and hope to have them back next year.


Kevin Adams

Showgoers had plenty to see, including an impressive livestock selection.

The Marine Aquarium Expo became the largest and one of the most popular aquatic events in the entire nation almost instantaneously. Confirming this are the many great people from around the country who have visited our show. Frank and Linda from Arizona visited MAX for the first time this year, and they, of course, assured us they will make this an annual trip, as will Pam and Anthony from Nevada and Charles and Chris of Boston, Massachusetts. This is very humbling to us and only reinforces our motto that much more: "We do what we do for people like you!"

Kevin Adams

The MAX mermaids handed out copies of *TFH* Magazine.

classifieds

AQUATIC PLANTS

BUSINESS OPPORTUNITIES

FISH

FORUMS

LIVESTOCK & EQUIPMENT

Product Spotlight

Curved Corner Aquarium

Aquatop is shipping their new F Series of glass aquariums with seamless front panel design and an energy-efficient lighting system. Perfect for aquarists of all levels, the F Series is available in various finishes and is part of Aquatop's expanding line of glass aquariums that includes all-in-one nano systems, as well as high-clarity glass and frameless aquariums. The Aquatop F Series has key features that appeal to today's hobbyists, including better scratch resistance than acrylic tanks and curved front corners that eliminate unsightly silicone. An ideal aquarium for both salt and fresh water, the F series includes models in four sizes (30, 40, 50, and 60 gallons) and matching cabinet/stands are available. For more information, visit **www.aquatop.com.**

DOC Skimmer

TUNZE introduces DOC Skimmers 9415 and 9430, combining very compact design with high performance. Ideal for installation in aquarium cabinets, they feature TUNZE Hydrofoamers 9420.04 or 9430.04, which simultaneously ensure proper foam production and water circulation. These new DOC skimmers have a number of advantages that include high skimming performance with low power consumption, bubble-free outgoing water, high-quality materials, controlled performance, easy cleaning, and very quiet operation. For more information, visit **www.tunze.com/info.**

LED Fixtures

Aquatic Life presents their new line of LED 1.0W fixtures and options to create a custom lighting solution that highlights the beauty of nearly any aquarium. White, blue, and purple LED lights allow for enhanced coral growth and help make the fish and corals within the aquarium visually appealing. For the first time, two 1.0W LED fixtures can be linked together in five different combinations for more even light distribution across the entire aquarium, contributing to its overall beauty. Plus, 90-degree reflectors around each LED reduce hot spots and offer even light distribution. And, optional 60-degree lenses can further customize light direction. For more information, visit **www.aquaticlife.com.**

Submissions: *Tropical Fish Hobbyist* • Product Spotlight • One TFH Plaza, Third and Union Aves. • Neptune City, New Jersey 07753
Attn: Tsing Mui • Email: tmui@tfh.com • Presentation in the "Product Spotlight" is purely informational and does not constitute an endorsement of the products by *Tropical Fish Hobbyist*. All submissions may be edited for length and content.

in next month's issue...

spawning tetras

Tetras can prove to be good breeding challenges for those who have some experience spawning fish. The stunningly beautiful morpho characin (*Poecilocharax weitzmani*) is an especially difficult one to breed. Learn how one expert fishkeeper met the challenge of breeding the species so you can achieve success in your own tanks.

Mark Denaro

Bob Goemans

dancing shrimp

Although many marine aquarium hobbyists add shrimp to their tanks for utilitarian purposes, there are several that make great inhabitants of their own accord. One of these is the sexy shrimp (*Thor amboinensis*), which is known to perform dances bound to amuse any observant aquarist. These engaging animals will also help keep some coral and anemone species clean in the tank.

back to basics

A planted tank can be a gorgeous addition to your home, but it can also become cost prohibitive and difficult to maintain. However, it doesn't have to be that way. There are many plants to choose from that require lower light levels and don't require excessive fertilization or supplemental carbon dioxide. Learn how to set up a low-cost, easy-to-keep planted tank that is bound to work well in your living space.

Drinda Jacobson

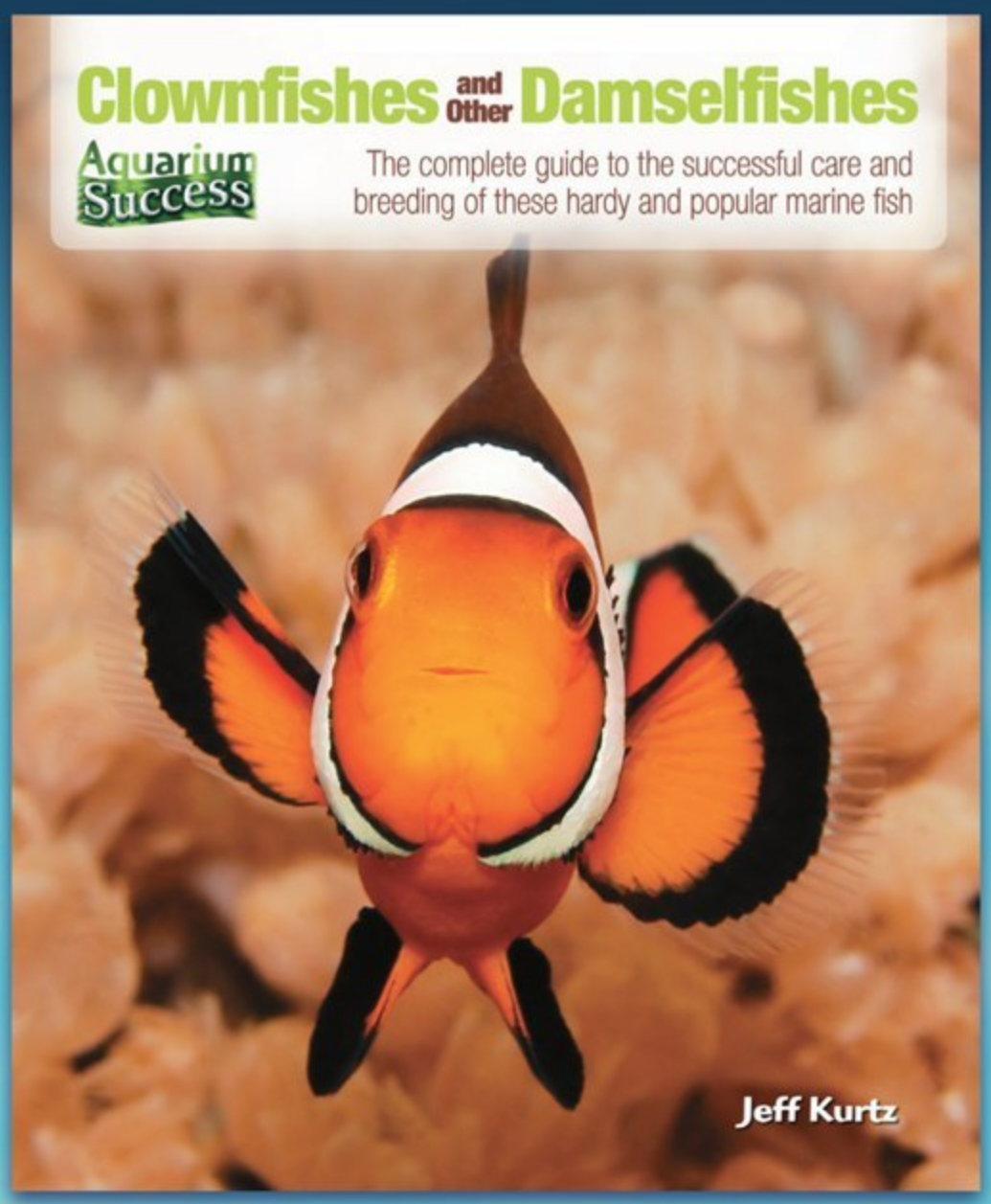
Read About All This and Much, Much More in the August 2012 Issue of *TFH*!

Content subject to change.

advertiser index

Aquarium Success

You Can Succeed With Marine Fish



Aquarium Success:
Lionfishes and Other Scorpionfishes
ISBN13: 978-0-7938-1679-8 $10.95

Aquarium Success:
Clownfishes and Other Damselfishes
ISBN13: 978-0-7938-1678-1 $10.95

Each of these books contains expertly written advice on the care and breeding of specific groups of fish. Each one details the proper aquariums, water chemistry, temperature, diet, breeding, and other important topics for keeping these fish. They also contain a guide to available species and discussion of suitable tankmates. These books put the keys to having a successful aquarium right in your hands.

Books available at www.petbookexpress.com and at aquatics and book retailers nationwide.
For additional book info visit us online at www.tfh.com

PARTING SHOT

Photo: Kim Yusuf

Bigeye trevallies

Caranx sexfasciatus

This breathtaking over-under shot of a school of bigeye trevallies (*Caranx sexfasciatus*) was taken on the reefs around the Malaysian island of Sipadan by underwater photographer Kim Yusuf (www.liquid-kingdom.de). Kim found this photo challenging to take because the deep water made supporting his camera equipment difficult—for a photo like this, the camera needs to be in an underwater housing equipped with a dome port as big as possible. Having to align the jacks, island, and horizon with half of the heavy camera under sea level and the other half above while he was floating with scuba gear in 10 feet of water, with waves pushing him away from the quick-moving fish, made things quite a hassle. But after 20 minutes and approximately 50 shots later, he nailed the photo of a lifetime.

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"Monty" the
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