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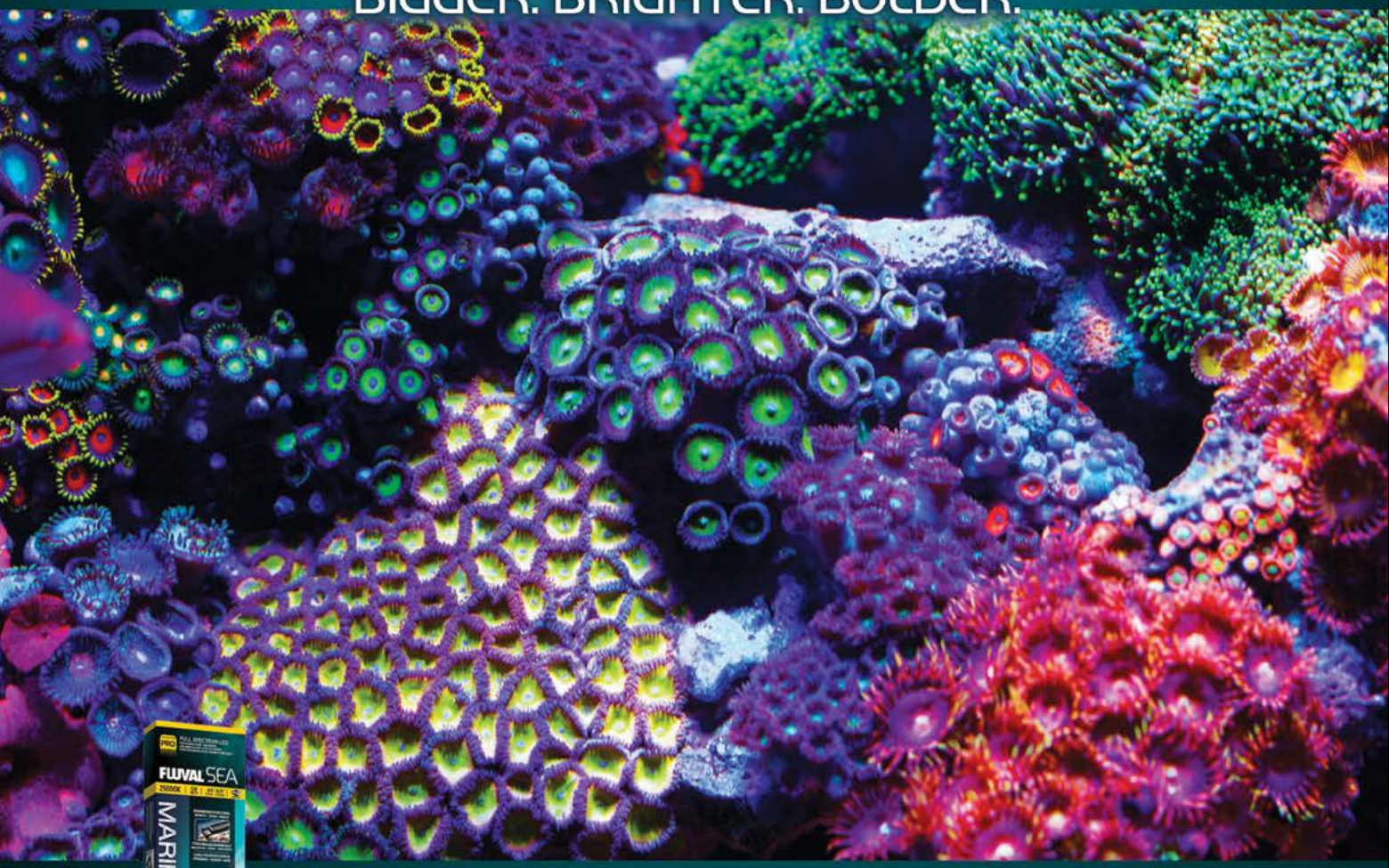

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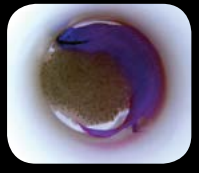

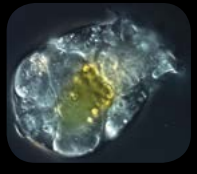

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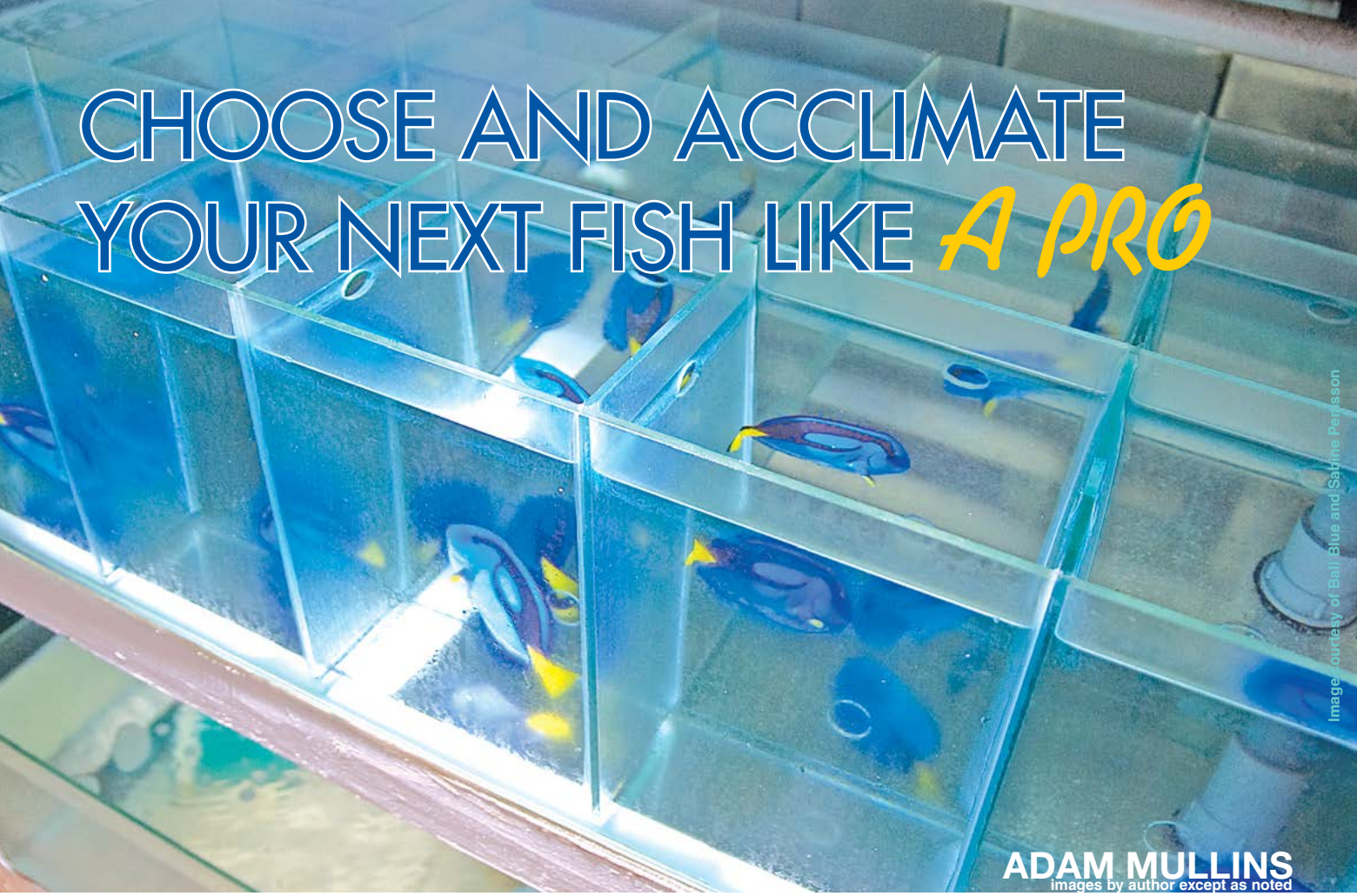

Image courtesy of Bali Blue and Sabine Pierjsson

ADAM MULLINS
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What journeys have our livestock taken by the time they reach our aquariums? What stressors have they endured? And what can you do to make the difference between adding a fish just to watch it disappear into the rocks, never to be seen again, and having that same animal thrive for many years? Unfortunately, far too many aquarists have experienced the sadness of a new fish suddenly disappearing or dying after being brought home. Why is this? Well, there are many potential causes.

Wild fish undergo a series of stressful transits and changes of environment between their original homes on the reef and your tank. Beyond buying from a trusted and reputable store, most of these stressors are simply out of your control. In some instances, a new fish may already be sick when you receive it. This is a strong argument for the need to choose fish wisely and to quarantine absolutely every fish you acquire.

Collectors and exporters will usually keep fish in a flow-through system with shared water; while this water is typically medicated to prevent disease transmission, infection is still a possibility. Because fish are traveling in sealed plastic bags from the exporter to the wholesaler, they must be purged (held without feeding) before being bagged for what might be a long flight to the United States. An exporter might purge a fish for up to 3 days (depending on species and size) to ensure that the fish doesn't pollute its bag with too much waste during shipping. This means that the fish is already somewhat weakened when it starts its journey and needs to be carefully acclimated to new water conditions and new foods once it arrives at the wholesaler.

Most fish in our hobby are sourced from the wild. Assuming you buy from a reputable store that places an emphasis on the quality of its wild-livestock sourcing, you should receive fish that are likely to acclimate well to your tank. Important considerations for choosing

The skinny body on this Yellow Tang should raise questions about whether this fish is healthy. | Image by Karelj

Clear fins and eyes, along with a full gut, are good indicators that this Yellow Tang is healthy. | Image by H. Zell

the individual fish itself include size and some easily observable markers of good health. Look for clear fins and eyes, a fat gut, normal breathing rate, no redness on the gills, and no ich or visible parasites, such as flukes or worms. More general considerations include whether the fish is feeding, what diet it is being fed, its eventual size, its likely demeanor toward tank mates, and how other established tank mates are likely to react to it.

When you purchase livestock from reputable stores, knowledgeable store employees or owners can be helpful in making stocking decisions and can tell you how long they've had a fish in the store (the longer the better, normally) and what the fish has been eating. These same employees/owners would also be able to tell you the general temperament of a specific fish and the species' overall success in home tanks. Being able to watch an individual fish eat in front of you and being able to walk away with a new fish that day, minimizing the transit time to your home tank, are also huge benefits of purchasing from a local fish store.

Recognizing that fish have been through a trying and exhausting journey before they even arrive at your local store, you should do everything in your ability to ease the stress on the fish when you finally bring it home and eventually introduce it into your home tank. This process starts with acclimation.

Acclimation and conditioning can be a multi-week-long process, with the final goal being the safe transition of a fish to its new environment in the least stressful manner possible. Depending on the fish's needs, there are many different approaches you can take with regards to acclimation. The easiest but least effective procedure is the bag float.

Floating the bag in the aquarium only acclimates the fish to temperature. If you leave the aquarium lights on during the process, they can heat up the water in the bag, which often leads to stress.

The bag float is the least effective method of acclimation.

Tank-raised clownfish offer many benefits over their wild counterparts.

Certain hardy animals can be acclimated with just a float, but it is generally recommended to gradually introduce the fish to the new salinity and pH of the tank water as well. This can be done by transferring both the fish and the bag water into a bucket. Next, using a length of airline tubing with a small valve, start a slow siphon drip from the quarantine tank into the acclimation bucket. This will slowly equalize the differences in salinity and pH and should take a minimum of a half-hour, at which time the volume of water in the bucket should have doubled. If the parameters of the water from the fish store are known to be very different from your quarantine tank, drip acclimation should be done more slowly. Be sure to keep the bucket away from cold drafts and add a heater to maintain water temperature in the bucket if necessary. It is important to monitor temperature constantly during this process. This drip acclimation is a necessity for many invertebrates such as starfish and shrimp, and it is less likely to stress sensitive species of exotic fish.

Drip-line acclimation is the best way to introduce fish to new water parameters.

This is a good time to point out that there are many valuable benefits to purchasing tank-raised livestock, particularly with regard to acclimation and conditioning. There is no need to introduce the fish to a completely new diet, there's a vastly shorter supply chain, and the risk of parasites is practically eliminated. This does not mean that quarantine and careful acclimation are not still important considerations, but they are typically much less complicated and conditioning the fish to captivity is unnecessary.

One of the most important tools that can be used to condition a new fish is a quarantine tank. Quarantine tanks provide a clean environment where the new addition can be treated for any diseases or infections before it is released into the display. They are also useful for conditioning wild fish to tank life by introducing new foods in a relatively calm environment. Unfortunately, quarantine tanks are sometimes too sterile for certain aquarium fish that require sand substrates and/or live rock to graze on, such as Mandarins, sand-dwelling wrasses, or sifter gobies. Live rock or sand contain supplemental foods for these new animals, and that can mean the difference between life and death. You can use live rock or sand in quarantine tanks if no medications are in use.

Keep in mind that many of our wild aquarium fish are used to eating a varied diet of algae and live foods, such as copepods and other small invertebrates. The transition to a commercial aquarium food may be an unexciting proposition for a wild fish, and this is often a stumbling block in conditioning. During this early period in quarantine, I offer a variety of foods to new livestock, including pellets, frozen mysis and omnivore diets, Arcti-Pods, chopped krill, and various alga for grazers. As I've noted in previous articles, however, it's not just the types of food, but how they are offered that stimulates a behavioral feeding response. During this time, elimination of stressors (fighting, diseases, water-parameter fluctuations, etc.), as well as initiation of feeding and proper diet, are of utmost importance.

Once your fish is feeding well on its new diet and has remained healthy for its time in quarantine (typically 6 weeks), the next step is to introduce the new fish to its tank mates. During introductions, territorial disputes can often arise, resulting in the harassment and even death of a new fish. In addition to territorial battles, another common cause of aggression between fish in the home aquarium is the introduction of conspecifics (i.e., fish with similar body shapes and/or colorations), such as Yellow Tangs and Purple Tangs.

Although tangs are a staple of the saltwater hobby, they can also cause many headaches for the hobbyist, which makes appropriate selection important. New hobbyists may assume that a recommedation of a certain fish such as a Powder Brown Tang for a larger aquarium, even when the fish is small, is arbitrary. But experience shows that these open-water swimmers can bolt

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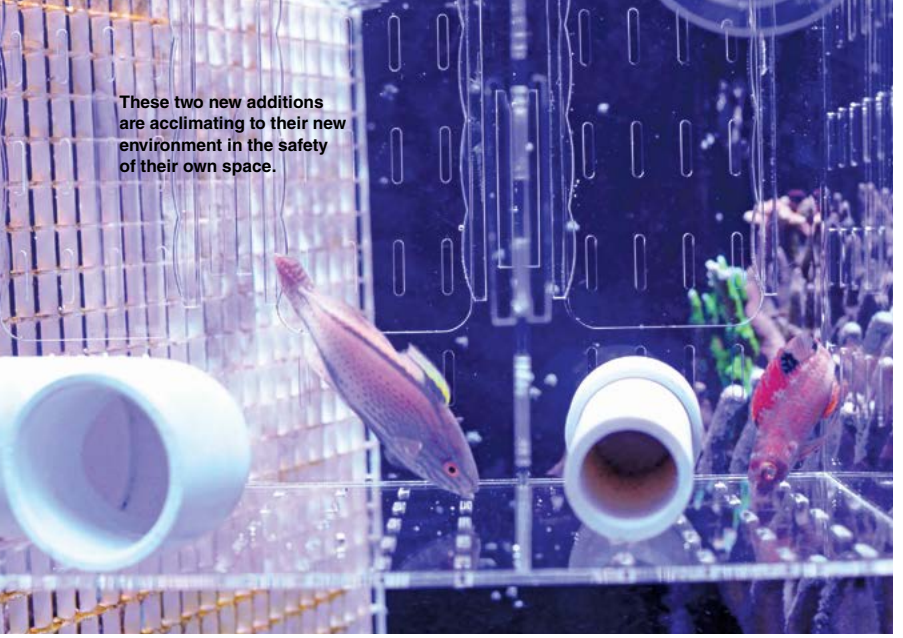
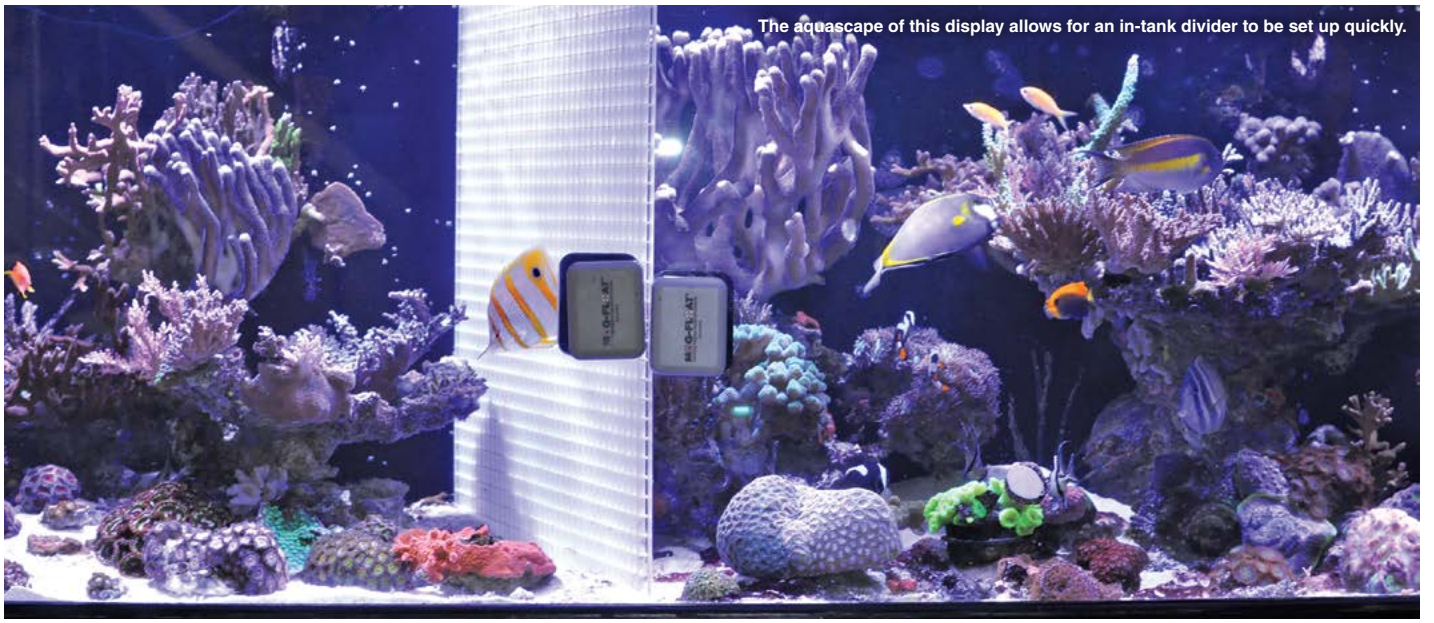


These two new additions are acclimating to their new environment in the safety of their own space.

the length of the longest home aquariums (8 feet, 300+ gallons) in just a few seconds. This suggests that smaller environments increase stress by limiting foraging and swimming space. These fish are the grazers of the reef and cover huge amounts of territory daily in search of their low-nutrient algae diet. They can be quite aggressive at defending their territories from competitors in what is essentially a life-or-death struggle for food and space on a wild reef.

While diving in Hawaii, I witnessed two large Achilles Tangs violently defending a patch of reef about the size of a large living room from a school of Convict Tangs. Both species have poor track records in the aquarium hobby, mainly due to their aggressive natures and need for large amounts of space, constant grazing, and pristine, highly aerated water. Once a new competitor for space and food is introduced into a home aquarium, the established residents can quickly chase it into a cave, never to be seen again, or they can chase it right out of the aquarium. A new fish, not knowing where predators may be hiding in the rockwork, can feel it has no recourse but to try to jump out of the tank.

Therefore, introduction can require some physical separation, especially when introducing known conspecifics, such as a new tang or clownfish, when already-established ones are in the tank. This can be accomplished with various in-tank holders for smaller fish (gobies, clownfish, smaller wrasses, etc.) or by creating an in-tank divider to separate larger fish. This divider method can be done simply and effectively using egg-crate material, but it generally requires some forethought in aquascaping to allow for easy partitioning of the tank. I maintain a gap between coral bommies where a single piece of egg crate, held in place with magnets, can stretch from the front of the tank to the overflow box in the rear. This allows a new fish to be introduced and settle into its new environment while staying separate from the main fish population. It is also an effective way to isolate



The aquascape of this display allows for an in-tank divider to be set up quickly.

problematic fish that need to be removed without having to tear the entire tank apart.

Now that you have learned how to assess your next fish purchase properly, you should be able to pick a fish that is healthy and compatible with your tank and its established inhabitants. But remember, that's only the beginning of the story, and what you do once you bring the animal home can make all the difference. Successful maintenance and care of these animals begins with proper acclimation, quarantine, and conditioning. As hobbyists, we have a responsibility to provide these animals with the best possible environment. Through these efforts, we will be able to continue to witness firsthand the many amazing behaviors that make the ocean, and our little slices of it, so captivating.

Kung Pao Monti (*Montipora Palawanensis*)

The New Wave of Highly Collectible *Montipora*

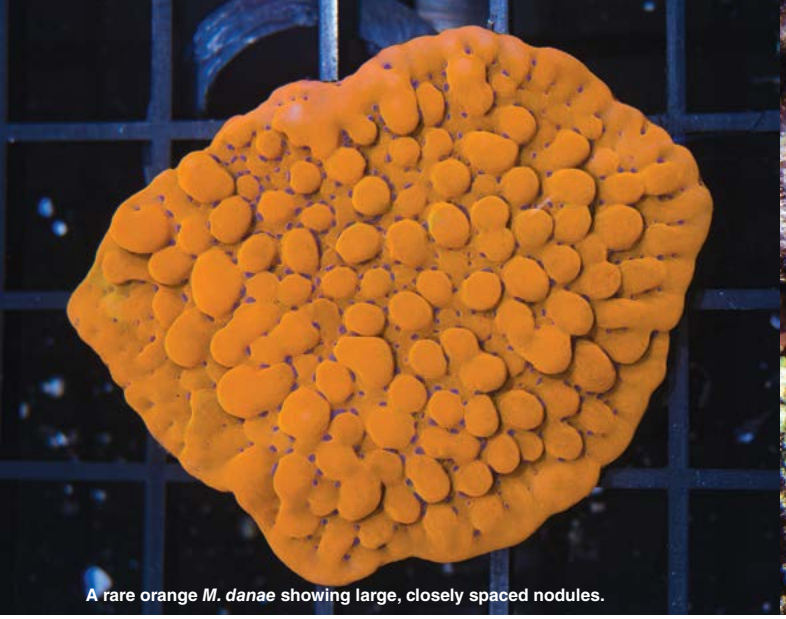
JAKE ADAMS

Since the beginning of our hobby, reef aquarists have always been on the lookout for attractive and interesting corals. Species from the *Acropora* and *Montipora* genera were always highly coveted, but it was the wide range of fascinating Montis that really kicked off our fragging culture and, subsequently, the nano-reef side of the hobby.

Undata, Superman, Rainbow, Pokerstar, and Sunset Montis gave us our first taste of how wildly interesting and colorful this genus could be. Even frags as small as a quarter inch would display beautifully colored tissue with brilliantly contrasting polyps. These frags could be easily grown out in even the smallest tanks. While various SPS (small-polyped stony) corals have always been popular, it wasn't until we had access to these psychedelic Montis that our current era of coral collectoritis began.

The reef hobby's lust for *Montipora* has waxed and waned, but it's never gone away. With the rise of maricultured corals and the cross-pollination between the business and hobbyist sides of the aquarium world, new *Montipora* strains are being discovered at the highest rate we've ever seen, resulting in a fresh new wave of Montis being introduced to the hobby.

The newest crop of collectible *Montipora*, with trade names like Beach Bum, Kung Pao, and Peach Crumble, come from the hobby's best coral farmers and are part of a handful of very interesting new varieties. It's up to the *Montipora* aficionados to debate over the



A rare orange *M. danae* showing large, closely spaced nodules.

A wild colony of Superman Monti (*Montipora monasteriata*), often misidentified as *M. danae*.

highly subjective values of these different strains. However, this new influx of *Montipora* mostly belong to a handful of exotic species, and knowing them should help diehard *Montipora* collectors better understand the diversity of Montis available to them.

The species of *Montipora* that are generating this new spike of interest include *Montipora danae*, *Montipora palawanensis*, *Montipora cebuensis*, *Montipora verrucosa*, *Montipora verruculosus*, and *Montipora capitata*. These coral species are characterized by large, prominent nodules with growth forms exhibiting varying degrees of alignment into ridges. These gnarly *Montipora* species range in colony shape from plating to encrusting, submassive to branching, and many of them are multi-colored, with bright, contrasting polyps. There's a gradient of textures and shapes, and it's hard to know where one species ends and another begins, but I'll do my best to describe them.

It's probably wise to start with the coral you *think* you know the best: *M. danae*. Monti strains like Superman and Rainbow have long been incorrectly identified as *M. danae*; these are in fact *Montipora monasteriata*. The true *M. danae* has very large, pronounced nodules that are tall, thick, and close together, with a small space between them where prominent polyps are located. Under typical growing conditions, *M. danae* grows either as a plating colony or encrusted on a rock. However, in very strong light, it can grow in a submassive form, but typically, the skeleton will be an even thickness throughout the colony.

The polyps of *M. danae* are immersed between the nodules and are most easily seen from above. Therefore, if you look at it "edge on" and can't see the polyps in the center of the colony, you probably have a *danae* on your hands. Since *M. danae* has a very specific appearance, it is practical to think of this coral as the archetype for these species of nodulous Montis and to describe the others as they relate to *M. danae*.

M. verruculosus is the most like *M. danae*, but this species has a slightly different surface texture and growth form. The nodules of *M. verruculosus* are about as tall as they are in *M. danae*, but they are not as thick, and the polyps are much more abundant in *M. verruculosus*. The nodules are mostly evenly spaced in the center of the colonies but become slightly irregular toward the growth margins. At the margins, they begin to align into radiating ridges of approximately 2 inches in length, perpendicular to the leading edge of the colony.

Similar to *M. verruculosus* is *M. verrucosa*—and it doesn't help that they were given nearly identical scientific names. Relative to *M. danae*, where *M. verruculosus* has nodules that are about as

The nodules of *M. verruculosus* are separated in the middle of the frag and begin arranging into rows at the margin.

tall as they are thick, *M. verrucosa* has nodules that are not as tall, but about as thick as *M. danae* and with clearer spacing between them. But the real difference between these two Montis is in their colony shape. *M. verruculosus* tends to be more plating when the colony is mature, but *M. verrucosa* is much thicker, with a more submassive growth form that can develop lumps and ridges in the older parts of the colony.

To be honest, it's challenging to identify any of these species from a frag—particularly *danae*, *verrucosa*, and *verruculosus*—but it

M. verruculosus on a wild reef in Bali, Indonesia

A closer look at *M. verrucosa* shows the thick bumps and nodules arranged into ridges at the edges.

A larger colony of *M. verruculosus*

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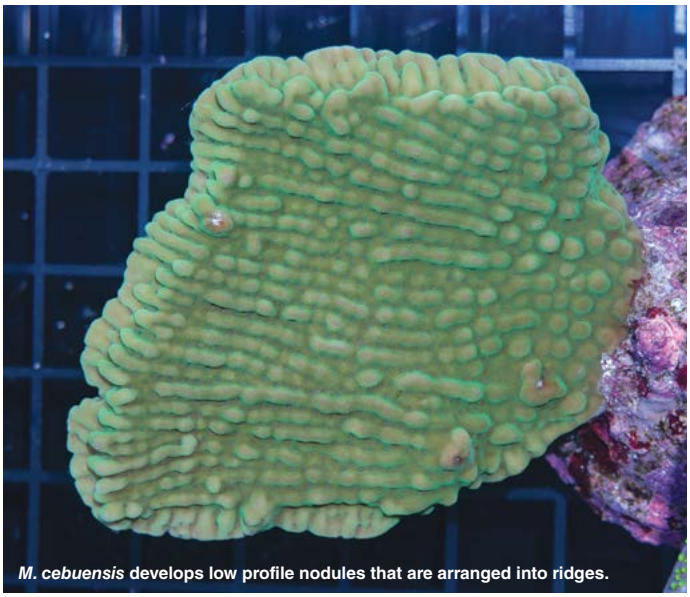
M. verrucosa **(center) and** ***M. capitata*** **(top right) growing next to each other**

gets much easier after they've grown out a bit. If these species are grown in the same aquarium and under the same conditions for some time, they will develop to a point where the details are well-defined from the interior to the margin of the colony.

Two lesser-known and rarer coral species in this group are *M. cebuensis* and *M. capitata*. *M. cebuensis* is much easier to identify because its nodules are well-aligned from the center to the margin of the colony. In some specimens of *M. cebuensis*, the ridges can form a radiating pattern all the way to the colony's interior, making it clearly discernible from the others. *M. cebuensis* grows almost exclusively as a plating, foliose species. Under most conditions, it exhibits an uneven growth margin that is not nearly as continuous as what you'd expect from *Montipora capricornis*.

On the other end of the spectrum is *M. capitata*, the most branching of all these gnarly Montis. In *M. capitata*, the base of the colony is encrusting, but the bulk of this coral grows into uneven, contorted branches. The nodules are easily noticeable on the encrusting base, but they coalesce into bumpy branches that give this coral the common name of "Rice coral." (Finally, a common name we can easily remember!) While the Rice coral is still rare in the aquarium hobby, a brown strain of this coral was originally grown at the Waikiki Aquarium and distributed to public aquariums all over the United States. Once you get to know it, you'll see the Waikiki Rice coral in most major public reef aquarium displays throughout the country.



M. cebuensis **develops low profile nodules that are arranged into ridges.**

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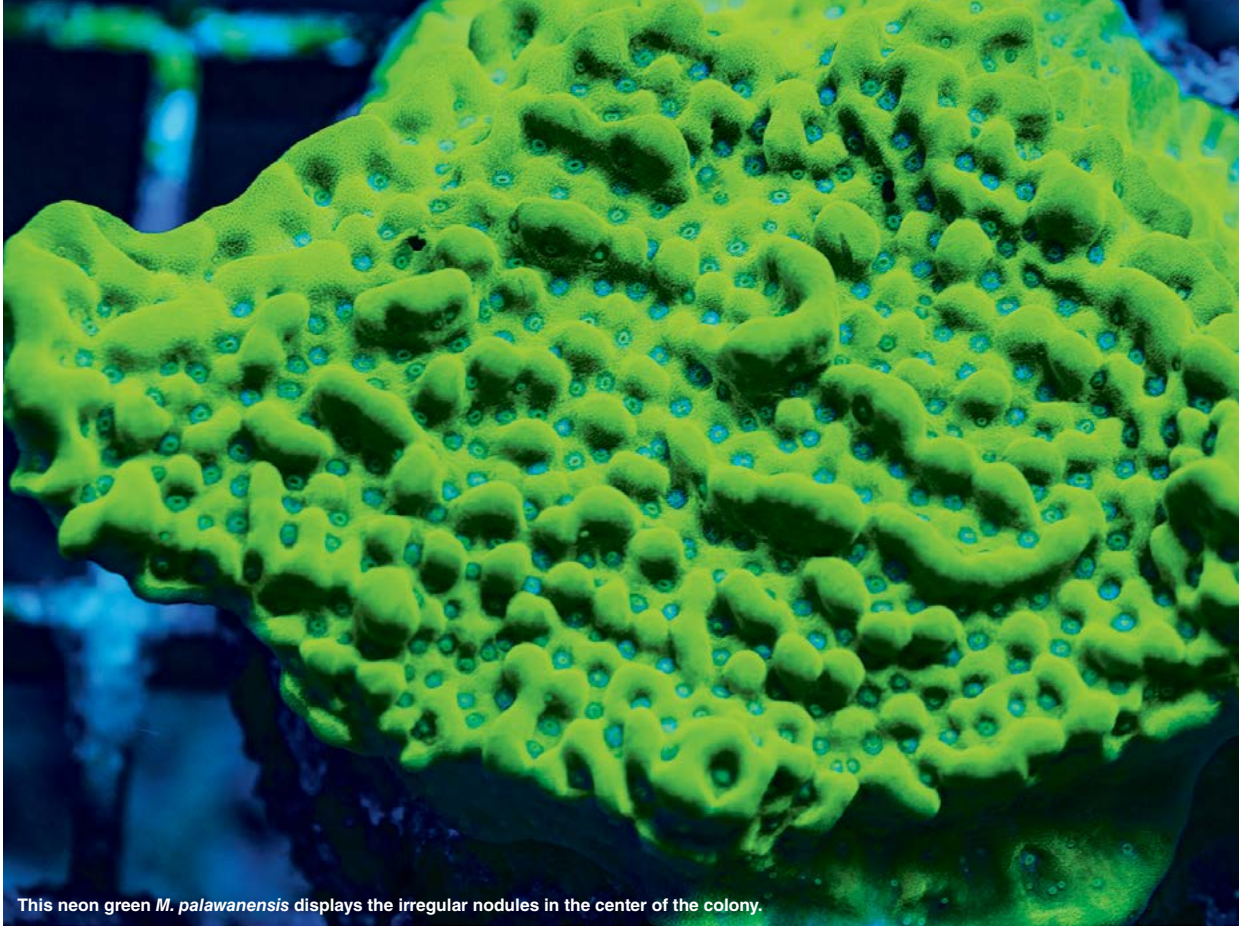
Last, but certainly not least, is *M. palawanensis*, the species responsible for most of the current buzz in the world of Montis. This species has a larger range of textures than the other gnarly Montis, and there's a gradient of nodule sizes, ridge formations, and colony shapes that seem to overlap with similar species. The nodules are well-defined in the center and are both tall and thick, aligning to a small degree toward the margin of the colony—but not nearly as much as *M. cebuensis* or *M. verruculosus*.



This neon green *M. palawanensis* displays the irregular nodules in the center of the colony.

Some colonies of *M. palawanensis* can have such pronounced nodule development that the polyps between them appear very crowded. I've seen a few colonies of *M. palawanensis* that had such strongly developed nodules that they coalesced into thick proto-branches over much of the colony; I wouldn't be surprised to find that these represent an undescribed species.

You might have noticed that I didn't mention color in any of the species described above. Coloration is a very poor indicator for identifying a coral. Most of these Montis are commonly seen in muted shades of light brown, sometimes with big, colorful polyps. Even when these colonies exhibit shades of green or blue, they only seem to be very light pastel shades. By contrast, *M. palawanensis* is the real star of the gnarly Montis, with bright colors both in the body and the polyps.

By my best estimation, the highly coveted Kung Pao, Beach Bum, and Altered Ego Montis are all *M. palawanensis*. Displaying base colors ranging from red, orange, and green to the occasional blue or purple, coupled with brightly colored polyps, *M. palawanensis* is the new darling of *Montipora* collectors.

There are also a few different strains of *M. palawanensis* that exhibit "infection" of different pigments. For example, the Altered Ego Monti is primarily red-orange with unpredictable green streaks throughout. It is my opinion that the Kung Pao Monti is a red-orange strain with a layer of green fluorescent protein on top of it. This gives the Kung Pao Monti a unique, lustrous gold color that can

A much thicker form of *M. palawanensis* that could actually represent a different species

exhibit more green or more orange, depending on the lighting spectrum, intensity, or even the angle from which it's viewed.

These gnarly Montis require the same basic care as most *Montipora* corals and will do well in a range of aquarium environments. From high to moderate lighting, high to low flow, and in all kinds of nutrient levels, these forgiving corals will thrive in a wide range of conditions. If you are interested in really seeing the full development of each species, you are more likely to see their unique characteristics when they are provided with stronger light. Montis are some of the first SPS corals to suffer when magnesium levels get too low, so keep magnesium pegged at 1350 ppm. Consistently adding very light doses of zinc will also help keep your Montis looking mint.

It's hard to make sense of all these new strains of *Montipora*; everyone and his brother slaps a unique name onto each strain they come across. The scientific names are hard to remember, but at least there are only a handful of them to consider. With over 70 species currently described, and probably many more that have not been formally described, it's no surprise that new strains of *Montipora* are constantly being exalted in the reef aquarium hobby. Thankfully, due to their hardy nature and great track record in reef aquariums, even the most exotic strains become more widespread and affordable through long-term propagation. If you're pining for a piece of Kung Pao, Beach Bum, or Altered Ego Monti, it'll only be a matter of time until you have a chance to score a sweet frag of even the rarest gnarly *Montipora*.

RICHARD ASPINALL

The Glorious Bandit Angel

The Bandit Angelfish is not for beginners.

There are few fish as striking or as instantly recognizable as the Bandit Angel, also known as the Banded Angelfish or *Apolemichthys arcuatus*. Just look at that bold black stripe, edged in brilliant white and set against a pearly, opalescent body color. Along the flanks, many of the scales are individually marked with striking highlights. The black theme is picked up again on the anal and caudal fins, which have electric-blue edging. In good lighting, a sky-blue tinge can be seen on the inner part of the caudal fin. In the waters that this fish inhabits (often found at up to 50 meters depth), it is an easy fish to see, depending on the available light at that depth. I might be wrong, but I've always taken this striking color pattern to be used to designate and lay claim to territory rather than to blend in.

Bandits belong to the *Apolemichthys* genus of angels. This genus contains nine species according to Fishbase.org, including the equally stunning *A. xanthurus* and another drop-dead gorgeous fish, *A. xanthopunctatus*, which I'll mention later. The genus *Apolemichthys* resides within the family Pomacanthidae, which holds six other genera of angels. Each genus (excluding the monotypic *Pygoplites* genus) contains many popular aquarium specimens.

Bandits have quite a limited range in the wild. Native only to the areas around the Hawaiian and Johnston Islands, they are nowhere near as common as many other angels in the hobby. I would suggest that Bandits are also rare in the trade due to their deep-water

Do your research before considering a Bandit Angel.

nature, making these fish harder to catch and more susceptible to injury during decompression. For all these reasons, they command a very high price, and you're unlikely to see one in a store. Most of these fish are going to be available by special order only.

I've met a few fish collectors over the years who've had fish collections that were worth more than my annual income, but it didn't make them great aquarists. Far from it. In fact, sometimes I think they selected their fish just because they were expensive. The aquarists I've respected most have been the folks with little cash who build a collection of fish and corals with hard work and commitment, not a fat bank account. While this might seem like a grumble, what I'm suggesting is that you need to be serious and confident in your ability to keep Bandits because, sadly, they are not for beginners and shouldn't be kept solely as status symbols.

Like many Pomacanthids, Bandits in the wild graze on sponges (among other things) and can take a while to begin feeding in captivity. Most discussions between Bandit keepers online suggest that foods that contain a good amount of sponge material specifically prepared for angels are very useful in getting these fish to feed, and that these same foods should make up the bulk of the captive fish's diet. Some Bandit owners report that occasionally, Bandits will begin feeding quickly in captivity and will settle for common fare, such as clams. I suspect these are fish that have been treated well during the catching and shipping process. Personally, when it comes to feeding, I'd continue the time-honored technique of matching the fish's natural diet as closely as possible by utilizing sponge-based foods, plenty of algae, and occasionally, enriched crustacean-based food. I'd offer small amounts of this varied diet as frequently as I could without compromising water quality.

I do occasionally read about Bandits that die inexplicably, with the subsequent comments about how these fish have a reputation for sudden death, as if it's the fish's fault in some way. The lesson here is to buy from a dealer who sources fish from reputable suppliers that are known for handling and shipping delicate fish successfully. After doing your research, voting with your wallet will ensure everyone benefits. You will also need to bear in mind that these fish have the capacity to live for many years, so while you can always find a dealer who will take a Bandit off your hands, consider whether the fish is compatible with your future plans. If you're moving the aquarium regularly, then you're creating conditions for the fish to succumb to stress.

My other tip would be to secure a youngster. Juveniles are easier to ship and less likely to suffer in the process. If possible, source one from a dealer who will hold the fish for you and ensure that it is eating well before you take it home. Not always possible, but it's worth trying.

With any purchase, you should plan ahead and consider whether you can offer the time, commitment, and money required to keep your tank and fish healthy. Once you have sourced and secured a fish, it will be too late to consider whether your aquarium is suitable.

Bandits, like many of their relatives, are found on rocky reefs with plenty of hiding places and room to roam, so they need large tanks

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Goldflake Angel

(with excellent water quality) that allow them enough space to move around and hide as they come to terms with their new home. A large tank well over 100 gallons is necessary, and it needs to have plenty of live rock arranged to offer small caves, hiding places, and of course, areas for the fish to graze. The "old school" live rock wall might be a good approach to take.

You can, of course, try to keep these fish in a tank populated with corals and other invertebrates, but there's a good chance your prized fish might nip at your equally prized coral collection. Some fish never seem to become nippers, while others develop a taste for polyps as they mature.

If you want a charismatic angel from this genus with a more reef-friendly attitude, then *A. xanthopunctatus*, or the Goldflake Angel, might be a better choice. While it is not guaranteed to be reef-safe, it has the reputation of being one of the better-behaved, larger angels in reef tanks. You might also find that it is equally or more attractive than a Bandit, with its gold-spangled flanks and pouting blue lips. The Goldflake Angel is also significantly

cheaper, though still out of my price range. I did consider buying one once, but the dealer found the fish dead one day. Paradoxically, I considered this a tragedy and a relief at the same time.

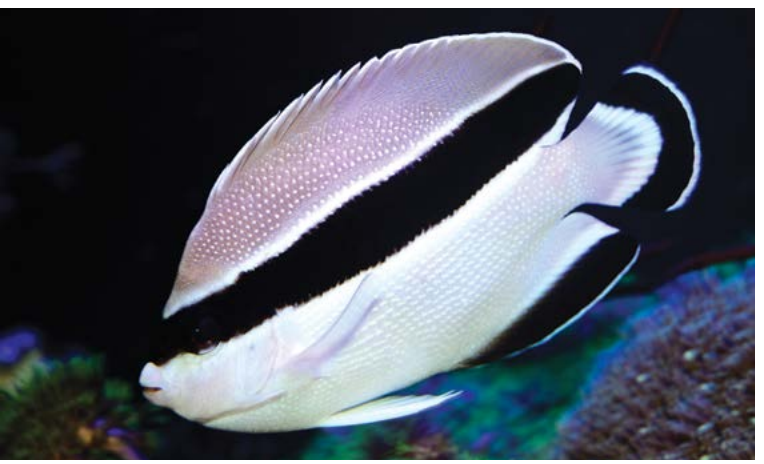
As far as water quality is concerned, it should be excellent and remain consistent. Having said that, in my experience diving in deeper water with high currents, temperatures can change quite rapidly as currents shift. In your aquarium, however, it is probably best not to mess with any parameters at all.

Given the Bandit's ability to graze constantly, it's a good idea to ensure you have top-notch filtration to remove nitrogenous waste as quickly as possible, though you might not need to be as aggressive in the removal of phosphates if the fish isn't kept with corals. Allowing a small amount of filamentous algae to grow on your live rock may be advantageous. I once saw a tank that contained a pair of Clarion Angels (yes, a pair!) that were grazing on the aquascape regularly and were very healthy.

I would also consider running a small amount of ozone through your skimmer, assuming that it's safe to do so. It is simple to add a small ozone generator with a suitable controller to deal with pathogens. You should also ask if your fish has been treated for internal parasites before you take it home. Needless to say, quarantine is recommended whenever possible. Having to tear down an entire aquascape to extract the Bandit will stress all the animals in your ecosystem.

It's worth carefully considering what other fish you plan to keep with a Bandit. Bandits may be aggressive to similar-sized fish, but could as easily be bullied by those same fish, depending upon which fish is added first. I'd play it safe and consider your Bandit to be the last large fish you add. Ensure that smaller relatives, such as *Centropyge* angels, have plenty of room to escape should the Bandit turn nasty.

The Bandit Angel is an astounding fish. While many hobbyists may never be able to afford one or simply may not want to spend that much cash on a fish, for some of you out there, this may be the perfect addition to your tank. If you have your eyes set on one of these beauties and can afford to add one to your display, please do your research and plan ahead.



A FEW OTHER CHARISMATIC BUT COSTLY ANGELS IN THE HOBBY

Multicolor Pygmy Angel (*Centropyge multicolor*)

Of all the fish mentioned here, this is the only one I have ever kept, because it is more affordable. Of all the *Centropyge*, I think this is one of the most charming. Keep it as your sole dwarf angel and feed it well. It will be a wonderful addition to your tank.

Clarion Angel (*Holacanthus clarionensis*)

For many, this is the ultimate fish to complete a collection of rarities. While I admit it is gorgeous, I think there are other large angels that are more attractive. I may be biased, because a single specimen is worth more than my car! Owning one has never been possible for everyday folks like me.

This fish, also from a limited geographical range, is actually quite easy to keep and settles fairly well into aquarium life once acclimated.

Excitingly, the Clarion has been at the center of recent captive breeding efforts, though you should not expect to see them for sale any time soon with a less than four-figure price. These fish are listed as vulnerable by the IUCN (International Union for Conservation and Nature), so I cannot personally recommend that anyone support their capture in the wild.

Regal Angel (*Pygoplites diacanthus*)

I mentioned the Regal Angel earlier—this is the sole species in the *Pygoplites* genus and is a superbly colored and marked fish. I've photographed them in the Red Sea, but they are found in the northwestern Indian Ocean as well.

Like Bandits, they can be slow to adjust to aquarium life and do better when given large tanks with plenty of hiding spaces and a diet rich in sponge-based food.

Japanese Pygmy Angel (*Centropyge interrupta*)

This is another highly prized species, but being a smaller fish, it is more readily accommodated in an aquarium of 75 gallons and up. Depending on the individual fish, it may or may not be reef-safe. It's also a little easier to keep, though this one also comes with a four-figure price tag.


Multicolor Pygmy Angel


Clarion Angel (male)


Regal Angel


Japanese Pygmy Angel

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The male Orchid Dottyback guards his eggs inside the PVC den.

KEEPING AND BREEDING THE ORCHID DOTTYBACK

CHAD VOSSEN

The Orchid Dottyback has long been one of my favorite reef fish to keep. Dottybacks are brightly colored, small, peaceful, and can be kept singly or in groups (in an appropriately sized tank). When kept in pairs or groups, they will usually spawn regularly in the tank. The Orchid Dottyback is found in the Red Sea and is rather difficult to source as a wild fish in the United States. When available, they can be priced as high as four times the cost of a captive-bred Orchid Dottyback. Luckily, captive breeding has made the Orchid Dottyback commonly available and affordable for any reef hobbyist.

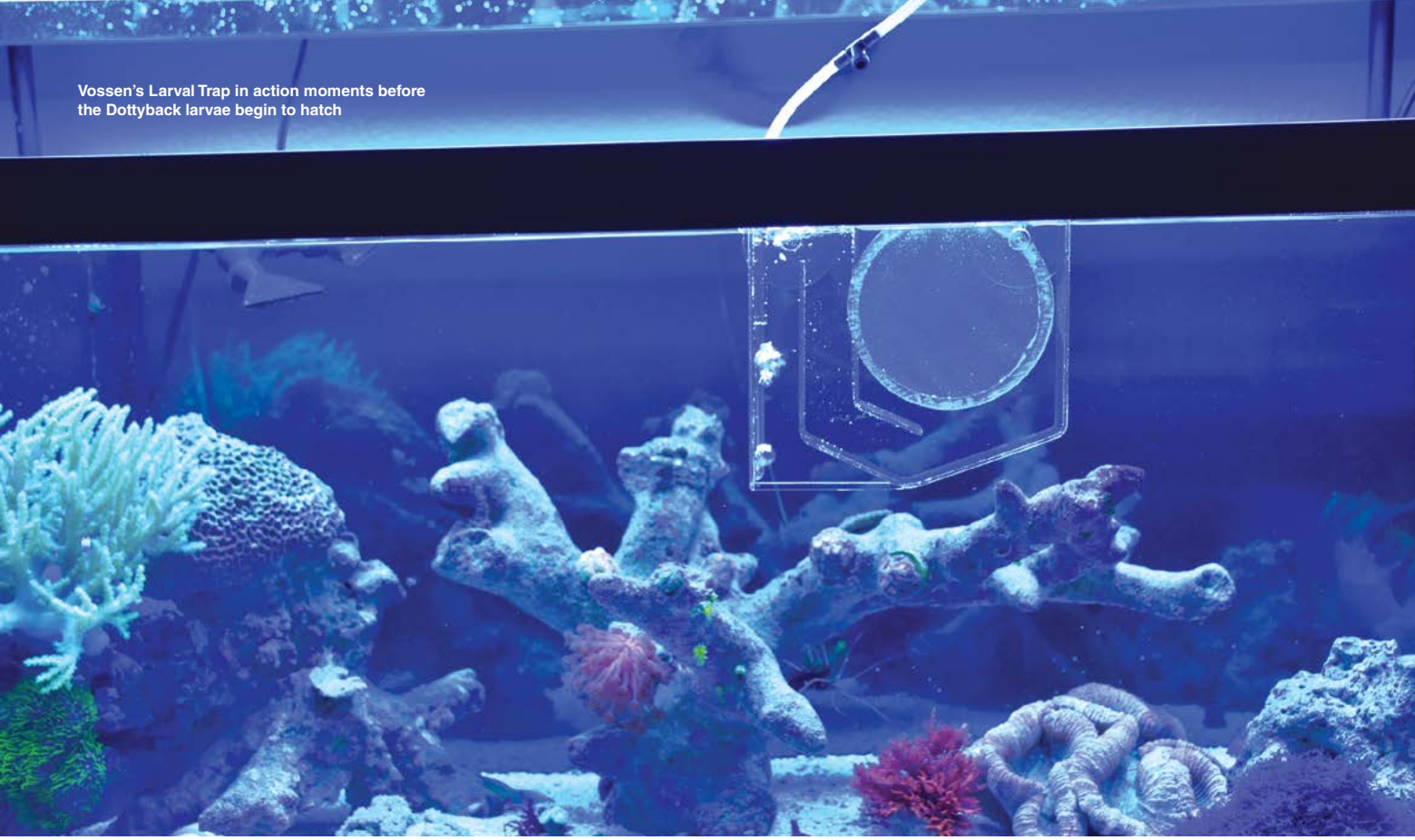
When purchasing your Dottybacks, try to obtain different sizes. The largest of the group will typically be or become the male, though your new Dottybacks may not always follow this rule. Any two juvenile fish will usually form a pair, while a juvenile group will easily form a harem. Pairs can be comfortable in as small as a 5-gallon tank and will quickly begin spawning if well fed. Females will become rounder in the belly area as eggs develop. Spawning activity can be seen when the male begins courting the female near his den. Courtship may consist of exaggerated swimming and fluttering to get the female's attention. The male will then lead the female to his den, where they will spawn out of sight. When the female emerges, her belly will be much thinner. The male will remain in the den and only emerge for food. Incubation typically lasts for 4 days, during which time the embryos will transform into larvae with silver eyes. Hatching takes place about 30 to 60 minutes after the lights go out on the 4th day and will often result in 500 or more larvae.

Male Dottyback outside his PVC den

If raising the larval Dottybacks is your goal, then it's a good idea to give the pair a spawning site that is easily managed. I recommend using 1-inch PVC pipe sections with caps on both ends. Drilling a hole in one cap (roughly the size of your Dottybacks) will allow them to come and go as needed. We have a PVC den in a 75-gallon reef tank, and our pair regularly uses it preferentially over the live rock, which I believe is due to the more secure nature of the PVC den.

When the eggs are ready to hatch, simply move the PVC den with the male and eggs to a container with a gallon or two of tank water. Turn off your lights, and the larvae will hatch in approximately 30 to 60 minutes. If the Dottybacks are not spawning in a PVC den, then collecting the larvae can be difficult. Fortunately, there are useful tools for collecting larvae, such as Vossen's Larval Trap. First, reduce the flow in the tank as much as possible since larval fish are poor swimmers. Any nocturnal fish, such as Banggai Cardinals, will also make collection difficult. Next, use the light lure on the larval trap to attract the larvae into the trap. Once you've collected your larvae, gently move them to the larval tank.

Larval tanks for Orchid Dottybacks can be made with just about anything. A standard 10-gallon tank will work if raising only a small number of larvae. We use 20-gallon "muck buckets" that are black. We call these black round tubs, or BRTs. BRTs are usually better for raising larvae than glass tanks since there are no corners for the larvae to get trapped in. The black wall is important in providing a contrasting background so the fish can see their food. We mount a rigid airline in the center of the tub so that the rising bubbles create a donut-shaped flow pattern, which brings food to the larvae. We have the BRTs sitting in a heated tray of water to keep them warm. Most people will need to place a heater in the tub with the larvae, in which case I'd recommend zip-tying the rigid airline to the heater and keeping both in the center of the tub.



Vossen's Larval Trap in action moments before the Dottyback larvae begin to hatch

Orchid Dottybacks can be raised on a few different types of foods, such as rotifers, copepods, and baby brine shrimp. For best results, you will want to culture copepods, such as *Parvocalanus*. Parvo is far better nutritionally than rotifers. However, rotifers are easier to produce in larger quantities. We focus on feeding rotifers and newly hatched brine shrimp as the bulk of the early larvae's food and supplement daily with Parvo to meet their nutritional requirements. After 7 to 9 days, the Orchid Dottybacks will be large enough to consume baby brine shrimp. This is a huge relief, since a batch of Orchid Dottybacks will consume an amazing amount of live food in a day. At this stage, we feed Parvo twice a day in addition to baby brine shrimp every few hours to meet their dietary requirements. If feeding rotifers and baby brine shrimp is the only option, then you'll want to enrich these foods with the best phytoplankton blends available. Proper nutrition is the key to getting Orchid Dottybacks through to settlement. If you are familiar with raising clownfish, you'll notice that Dottybacks have very large larvae compared to clownfish and absolutely eat much more. When we raise Dottybacks, we only raise a small percentage of the total number of larvae hatched just so we can keep up with their food requirements. Raising 100 Orchid Dottybacks out of a nest of 800 is far more realistic than trying to raise them all.

To culture *Parvocalanus* copepods, it's essential to also culture live phytoplankton, such as T-iso. *Parvocalanus* will not do well if offered non-living algae paste. Parvo can be cultured in 5-gallon buckets, though I have the best success in larger containers, such as 20-gallon BRTs with gentle aeration. It's important to keep the water lightly tinted with algae so the copepods can feed, but never

At only 20 days old, these Orchid Dottybacks have not yet changed color and are still larvae.

overfeed them. Parvo requires a clean environment to thrive and doesn't reproduce well if the culture is overpopulated. You should harvest your copepods by sorting them through different-sized sieves. When your Orchid Dottybacks are under 7 days old, you should harvest copepods between 40 and 80 microns, which are easier for the larvae to capture. When the Dottybacks are larger, they will do better hunting adult Parvo. You can then harvest only the adults, which are larger than 75 microns. This allows you to return the Parvo nauplii back to the culture or use them to start new cultures.

At about day 23, you'll begin to see your Orchid Dottybacks reach settlement and change color. They will start to seek shelter under and behind anything you have in the larval tank as they turn into little juveniles. We typically have a thermometer in the larval tank with the larvae and have found as many as 30 Dottybacks completely hidden underneath. If you can get all your Dottybacks gathered in a PVC pipe or something similar, it makes transfer to the growout tank much easier. Around day 25 to 30, you'll have a mix of purple Dottybacks and orange Dottybacks in the tub until they all turn purple by day 35.

Once all the Dottybacks have turned purple, it's time to move them into a growout system. The growout system should be furnished with many hiding places, such as PVC-pipe castles. You can create PVC-pipe castles by gluing 4- to 8-inch lengths of ½- to 1-inch PVC pipe together to form arches and other structures. The goal is to give the Dottybacks plenty of space so that they each have their own little territory yet still allow you to easily capture them later when it's time to sell them. We've made the mistake of putting 100 Orchid Dottybacks into a 30-gallon reef tank, which looks really

Orchid Dottybacks at day 25 showing a mix of larvae and juveniles

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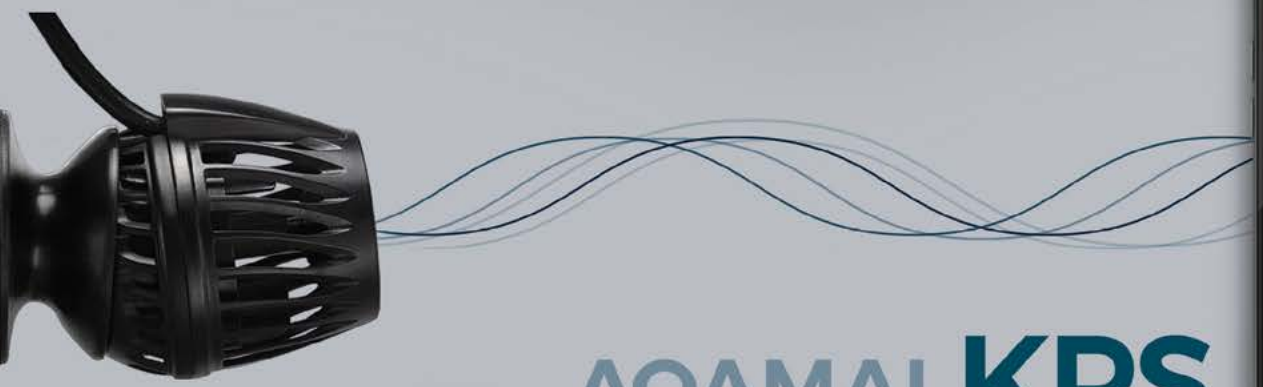

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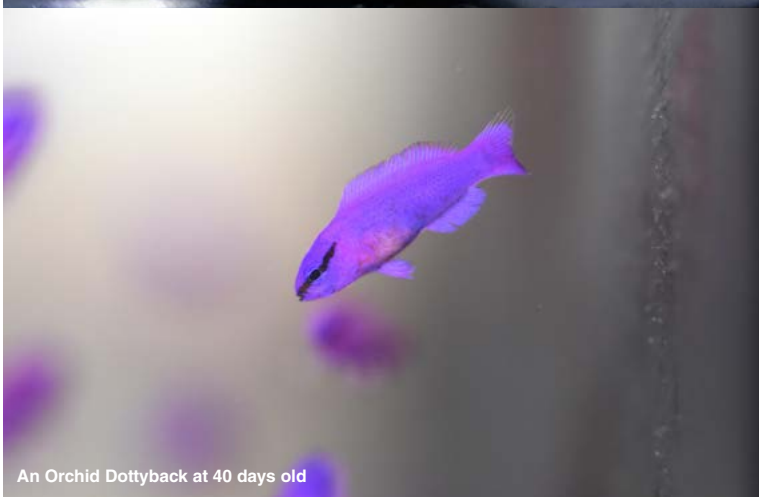
A small group of Orchid Dottybacks in the larval tank (day 35)


An Orchid Dottyback at 40 days old

awesome, but it is almost impossible to catch them when we need to. Going forward, we'll grow out the Dottybacks in bare tanks with PVC structures. Orchid Dottybacks grow really fast, and reaching the market size of 1.25 inches will take about 2 months. Right after settlement, we found them to be more interested in frozen food, such as PE Cyclop-eeze and LRS Reef Frenzy. It's very entertaining to watch a swarm of 100 Orchid Dottyback juveniles rip apart a 1-inch chunk of Reef Frenzy in seconds. You'll want to introduce pelleted food early on as well, since we've noticed faster growth rates when the juveniles eat quality pellets. APBreed TDO B2 and C1 have worked best for getting the Dottybacks onto a dry food, and we've noticed increased growth over our Dottybacks that are fed only frozen foods. Once the Orchids are on dry food, you can set up an automatic feeder and feed four times per day to keep them well fed.

When your Orchid Dottybacks are a few months old, it may be time to start finding them new homes. Not too many breeders are producing them yet, so it shouldn't be very difficult to sell them. We used to put a lot of focus on breeding clownfish, but it's a highly competitive market. I always recommend selling the Dottybacks as pairs or even in groups if possible. Your customers will appreciate the social interaction between the fish, as well as the weekly spawning activity. Breeding the Orchid Dottyback has been a very rewarding experience, one that has also proven to be reasonably profitable.

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ZOOPLANKTON ZOOBILEE

Cyclops sp. | Image by author

JASON ONEPPO

Many hobbyists find that they can reinvigorate their reefs by using zooplankton as a food source. New hobbyists are sometimes confused about what the difference is between zooplankton and phytoplankton, when to use zooplankton, or whether it's necessary at all. Unfortunately, the search for these answers often leads reefers to online forums that can be filled with inaccuracies. So, let's set the record straight.

Before we begin, let's take a quick look at what phytoplankton is. Phytoplankton, a.k.a. green water or microalgae, are plants that contain chlorophyll and require sunlight to grow. They consume nutrients such as nitrate and phosphate and convert them into proteins, fats, and carbohydrates.

On the other hand, zooplankton are animals that drift with the current. Many are microscopic, such as copepods, and others are much larger, such as krill. Some larval fish and invertebrates also fall into the zooplankton category. The first part of the word, "zoo," is derived from the Greek word "zoon," which means animal. "Plankton" is derived from the Greek word, "planktos," which means drifter.

The larvae of fish, worms, and other invertebrates are considered zooplankton when they are in their drifting phase. This type of zooplankton is known as meroplankton because these animals spend only part of their lives as plankton before completing metamorphosis. Planktonic animals that spend their entire lives as plankton are known as holoplankton (permanent plankton) and are constantly adrift.

In the ocean, zooplankton feed on phytoplankton. In some cases, larger zooplankton will also feed on smaller zooplankton. Zooplankton play a vital role in the food web of the ocean and are part of the diet of fish, invertebrates, and marine mammals. Animals like jellyfish, feather stars, and even ocean giants such as whales and whale sharks feed on zooplankton.

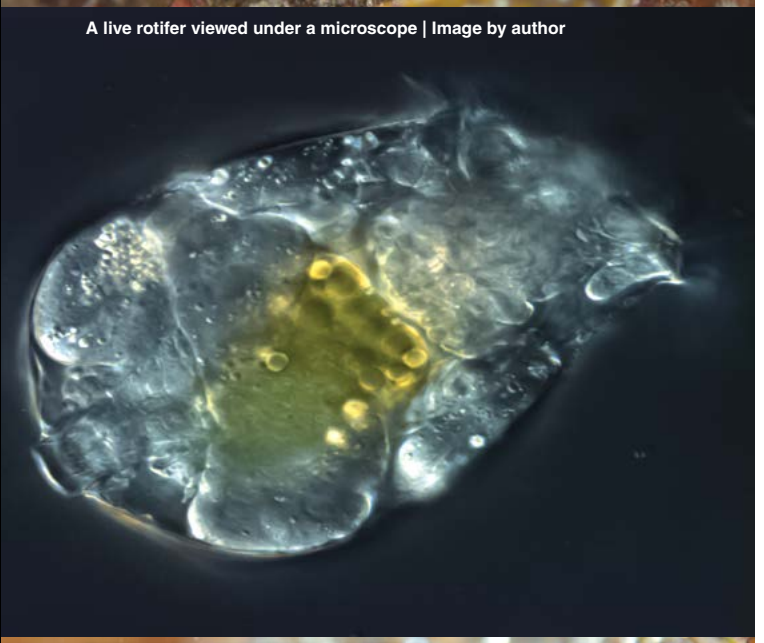
There are several varieties of zooplankton commonly available in the aquarium hobby. We'll start with small, almost microscopic organisms and work our way up to the big boys.

Zooplankton are available in many forms: cysts (eggs), live, freeze-dried, frozen, and liquid. They are often incorporated into flakes, pastes, pellets, and gels. No one form is necessarily best.

Rotifers are some of the smallest zooplankton used as food in the hobby, with most being around 0.004–0.02" long. They are called "wheeled animals" because they appear to have wheels rotating about the tops of their heads when viewed under a microscope. In the wild, they feed on particulate detritus, algae, protozoa, and

Jellyfish, now a staple in our hobby, feed readily on zooplankton such as frozen copepods and baby brine shrimp. | Image by Maria Bobrova

A Red Starry Dragonette hunts for live copepods in a home aquarium. | Image by orlandin



A live rotifer viewed under a microscope | Image by author

Rotifers will be an ideal first food for these clownfish larvae. | Image by Andrea Izzotti

dead bacteria. When cultured as a food source for larval fish or reef aquaria, however, they are most easily cultured with phytoplankton.

Rotifers that are cultured for use in aquaculture belong to the genus *Brachionus*. Although not a natural prey item for marine fish, rotifers are considered one of the best foods to use when breeding clownfish because they can be cultured in large numbers and reproduce rapidly.

Rotifers can be enriched shortly before harvest with phytoplankton or commercial enrichments such as SELCO. Live rotifers are only as nutritious as the food you feed them, so enriching your rotifers allows the fish larvae to develop and grow more quickly. They are also a popular food item for feeding reef aquariums and are used in marine aquaculture facilities and laboratories around the world. These animals make an excellent food for small and larval fish, hard corals, filter-feeding marine invertebrates, and tanks containing NPS (non-photosynthetic) corals. Rotifers are available as cysts and in live, liquid, freeze-dried, and frozen forms. They can be fed alone or mixed with other food items and/or supplements. Rotifers are also excellent for target or broadcast feeding in aquariums with a high density of filter feeders.

Copepods are a group of small crustaceans with teardrop-shaped bodies, long antennae, and a typical length of 0.03–0.07". They are found in both saltwater and freshwater environments and feed on phytoplankton, detritus, and bacteria. There are several marine species cultured and sold as food for reef aquariums or to seed refugiums. The most commonly available live species are *Tigriopus californicus*, *Tisbe biminiensis*, and *Apocyclops panamensis*.

***Apocyclops panamensis* with egg sacs | Image by AlgaeBarn**

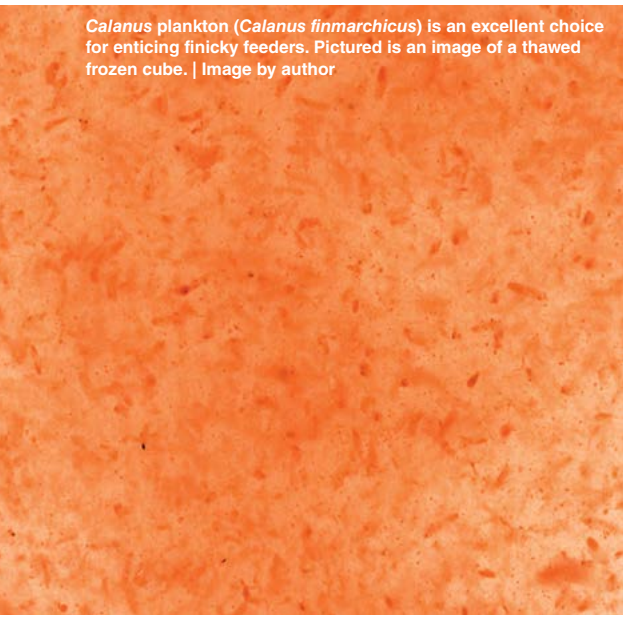
Live copepods are an appropriate food for marine organisms and make up part of the marine snow in the oceans. They are also a key food item in the successful rearing of larval pelagic marine fish, such as Yellow Tangs and Blue Tangs. Many of the frozen varieties of copepod are sold under the name of Cyclops and come from either brackish or freshwater environments. *Calanus* plankton (*Calanus finmarchicus*) is one of the most abundant species of marine copepod. It is an integral part of the food web and is sustainably harvested off the coast of Norway. *Calanus* is red in color due to the high concentration of carotenoids and astaxanthin within its body.

Copepods are ideal for both broadcast and target feeding in reef aquariums. They are an excellent source of nutrition for any planktivorous or small fish, such as anthias and Mandarins, as well as filter-feeding corals and invertebrates. Copepods come in a wide variety of forms. They are available in liquid, frozen, and freeze-dried forms and are incorporated into flake, pellet, and frozen foods. Live copepods are readily available at many aquarium stores and reef shows.

Brine shrimp are aquatic crustaceans that have changed little since the Triassic period. They grow to a length of 0.4" and are found in saltwater lakes around the world. Brine shrimp have been used as aquarium food since the 1940s and are a great stimulant and nutrition source for all reef aquariums. These shrimp rank at the top of the nutrition chart with high levels of essential fatty acids, proteins, and pigments. At one time, they were the most commonly available live zooplankton. Live brine shrimp are not as readily available these days and usually come at a premium price compared to frozen brine shrimp or what live shrimp used to sell for when they were commonly available.

Brine shrimp nauplii (baby brine shrimp) are an excellent source of nutrition, especially when used within a few hours of hatching, before the larvae have had a chance to absorb their yolk sacs. When freshly hatched nauplii are added to a reef aquarium, many corals will almost immediately exhibit a strong feeding response. The nauplii are an excellent main diet for carnivorous, omnivorous, and planktivorous fish (small- to medium-sized) and as a supplement for corals, anemones, and other invertebrates. They also make an excellent broadcast food for filter feeders. It is often a good idea to use brine shrimp when acclimating new fish because of their natural appearance and ability to attract finicky feeders. Fortunately, brine shrimp are now available in many forms, including cysts, live, freeze-dried, frozen, paste, liquid, and flake. Although they can be cultured and grown, it is time-consuming and does not yield a significant-enough harvest to make it worthwhile.

Mysis shrimp are small crustaceans, typically 0.2–1" in length. They are also known as "opossum shrimp" because of the presence of a brood pouch in females. Mysis are found in marine, brackish, and freshwater environments throughout the world. They are omnivores that feed on algae, detritus, and zooplankton. Without a doubt, they are one of the most popular foods used for feeding marine fish and reef aquariums because they are an excellent source of protein and fats. Mysis shrimp first gained fame as a food that many finicky marine fish, such as butterflies, would accept and the only non-living food that many seahorses would readily eat.



***Calanus* plankton (*Calanus finmarchicus*) is an excellent choice for enticing finicky feeders. Pictured is an image of a thawed frozen cube. | Image by author**

In the wild, anthias feed continuously on small zooplankton, such as copepods. In an aquarium, anthias should be offered a variety of zooplankton at least three times per day. | Image by melissa84

Live copepods are available at many local fish stores. To the naked eye, they look like little dots wiggling around in the water. | Image by AlgaeBarn

Live *Neomysis japonica* is processed for use in reef aquarium foods. | Image by I. Noyan Yilmaz

There are two commonly available species on the market: one hailing from the glacier-fed waters of Canada (*Mysis diluviana*) and the other harvested from marine and brackish estuaries in China (*Neomysis japonica*). Both varieties seem to have their own fans. I have heard from many people who prefer one over the other, but they are both highly nutritious. Mysis shrimp are available in live, liquid, freeze-dried, and frozen form. They are also used as an ingredient in flake and pellet foods. Besides being an excellent food for finicky marine fish and seahorses, many people also feed them to LPS corals.

Pacific plankton (*Euphausia pacifica*) is also known as Krill Pacifica. These pelagic, shrimp-like crustaceans have well-developed eyes (the black balls at the bottom of a bottle of freeze-dried plankton), with an average adult size of 0.6–1". Pacific plankton are diurnal filter feeders that feed mainly on detritus and phytoplankton. They are harvested in Japanese seas and the waters of British Columbia, with an annual harvest of over 70,000 tons. Pacific plankton are the natural food of seals, penguins, and baleen whales and are known to be one of the most nutritionally balanced feeds for fish and crustaceans. Those harvested from the waters of British Columbia

Euphausia superba is the largest species of zooplankton used as aquarium food. | Image by I. Noyan Yilmaz

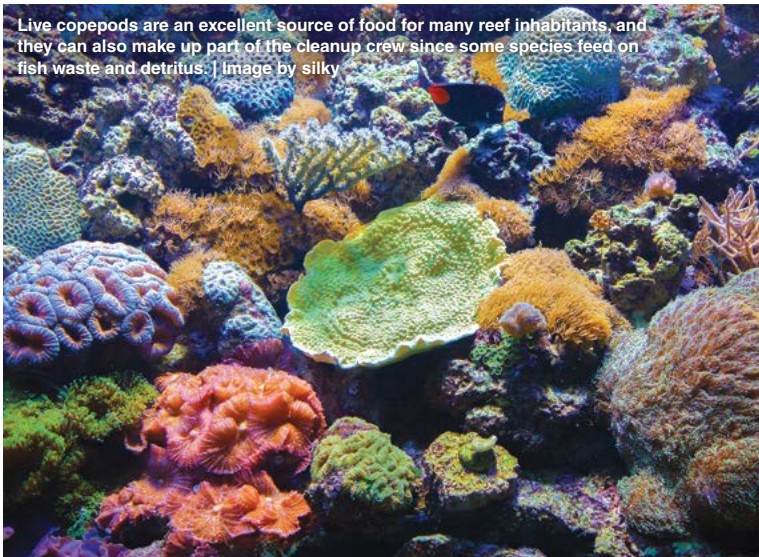
are destined to become food for fish farms or aquariums, while a small portion of those harvested off the coast of Japan are sold for human consumption.

Pacific plankton are known to be high in canthaxanthin, a pigment responsible for the yellow color in fish. They are not available live or in liquid feeds, but frozen and freeze-dried forms are readily available. They are also used as an ingredient in flake, pellet, and frozen blends, as well as powdered coral foods. Pacific plankton are an excellent alternative to mysis shrimp if you are looking for a food item with a high fat content that is less oily and has the ability to improve pigmentation.

Krill, up to 2" in length as adults, are small crustaceans of the order Euphausiacea and represent the greatest number of species within that order. They are a primary food source for many marine fish and mammals, including whales. Krill are pinkish-red in color and swim in swarms to avoid predation, sometimes swarming at the ocean's surface, making the water appear a pinkish-red color. They are found in oceans all over the world but are most abundant in waters surrounding Antarctica. They feed on phytoplankton and smaller species of zooplankton and will shrink in size to conserve energy when food is scarce.

There are over 85 known species of krill. The most common species and the one sold as food for aquariums is *Euphausia superba*. They contain extremely high omega-3s and astaxanthin, a carotenoid responsible for the vibrant colors of tropical fish. Krill are readily accepted by a wide variety of fish and are commonly fed as a natural color enhancer. They are also often incorporated into diets for coral in a liquid or dry (usually freeze-dried) form and are prized for their nutritional value and natural color-enhancing abilities.

Krill meal was a popular ingredient in aquarium feeds, but this past year, AAFCO (Association of American Feed Control Officials) enforced a long-standing regulation that bans krill meal from being used in fish food. Whole frozen and freeze-dried krill are still offered as single-ingredient foods or used as ingredients in aquarium feed formulas. The reasoning behind the ruling is that astaxanthin is only approved for use in salmonoid feed, and the regulating agency felt that producers of aquarium foods were using krill meal as a way to get around this regulation since there is a high concentration of astaxanthin in some krill meals. The level of astaxanthin and other nutrients in krill meal is determined by how the krill are processed (usually pressed) prior to being rendered as krill meal. Krill are not available as live or liquid feeds, but they are available frozen, freeze-dried, powdered, and as an ingredient in a variety of aquarium foods. Whole krill is an excellent food for many marine fish and invertebrates, including LPS corals.



Live copepods are an excellent source of food for many reef inhabitants, and they can also make up part of the cleanup crew since some species feed on fish waste and detritus. | Image by silky

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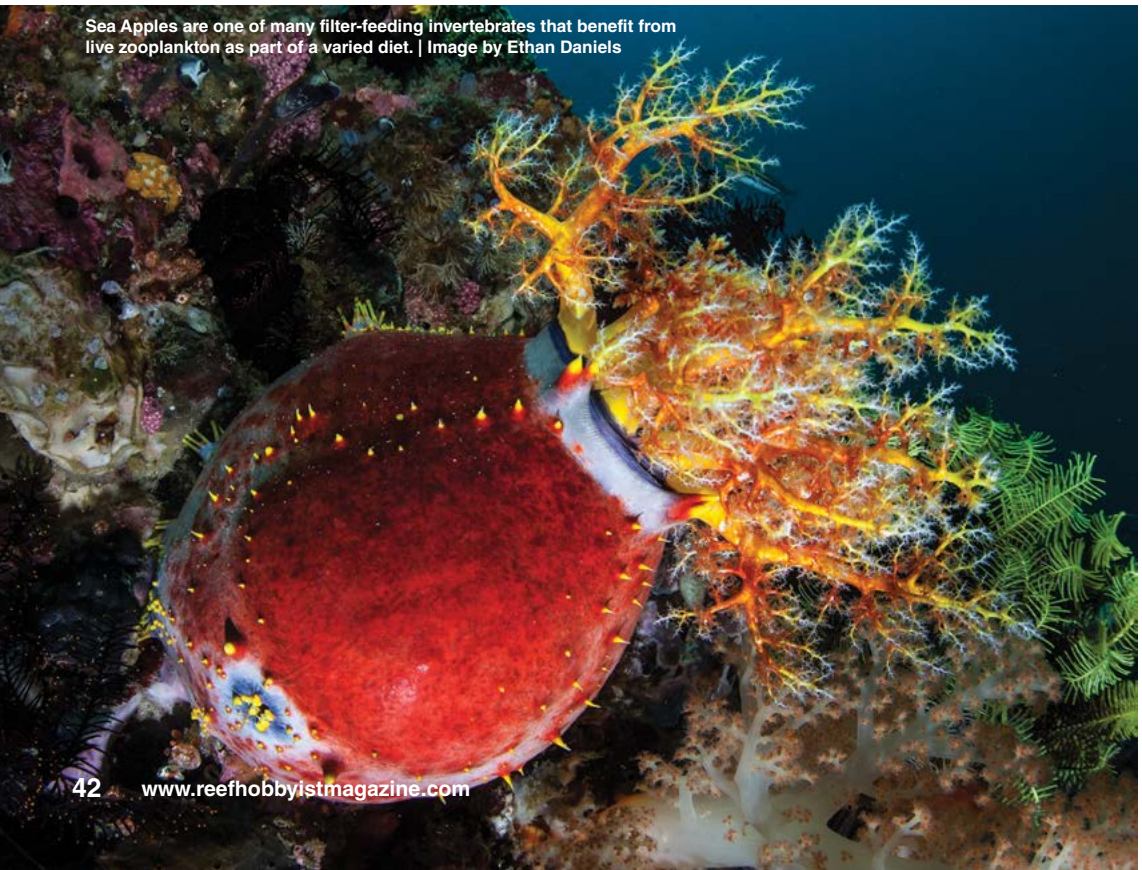
Many corals display excellent polyp extension when offered zooplankton. | Image by author



Sea Apples are one of many filter-feeding invertebrates that benefit from live zooplankton as part of a varied diet. | Image by Ethan Daniels

So, if you didn't know what zooplankton was, now you do. If you have a reef tank, you should be using zooplankton in some way, shape, or form. Zooplankton adds natural variety to any feeding regimen. In the wild, many reef fish feed continuously throughout the day on zooplankton, many of which are copepods. Although that sort of feeding would be difficult or impossible to replicate in a home aquarium without throwing the water parameters out of whack, it would pose an interesting challenge. Now that you are armed with a barrel full of knowledge concerning zooplankton, you too can help a newbie with this perplexing question. And, as always, keep it real, fishes!

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MICHAEL NGUYEN

SPS IWAGUMI

It all started with one dead aquarium plant, a frustrating evening, and a Google search that led me down the rabbit hole into a world of professional aquascapes created by none other than the late Master Takashi Amano. I was blown away by the inexhaustible variety of colors, plants, and landscapes, as if man had conjured the power to transplant a world of mountains and fantastic forests inside the confines of a glass tank. That evening, my frustration at not being able to keep the simplest of aquarium plants alive fueled an insatiable search for knowledge and understanding. In my mind, I had to do more than overcome this one failure. I, too, wanted the power to create worlds.

I watched every video that I could find on aquariums and aquascaping. I read as many articles as I could about nutrition, chemistry, and light. I spoke to local aquarists who would soon become my friends in this non-stop quest that would eventually lead me to Japan. At the headquarters of ADA, in a small town 5 hours outside of Tokyo, I saw the light of Master Amano's work through the glass walls. I listened to the team, learned their ways, observed techniques and layouts, and took that knowledge home. In one year, I had journeyed from killing an aquarium plant to creating my own little world inside a glass tank.

The International Aquatic Plants Layout Contest is the benchmark for freshwater aquascapers. Over 2,000 people across the world enter this competition yearly, and seasoned contenders are so serious that their aquascapes stay secret until the winners are announced. Was I ready for this? I submitted my aquascape with much doubt and hesitation. My entry was sent to Japan, and I waited for the judges' verdict. With little left to do with my freshwater aquascape, I decided to delve into the dark side: saltwater. Much of what I knew from the freshwater side transferred over, but there was still a lot to learn.

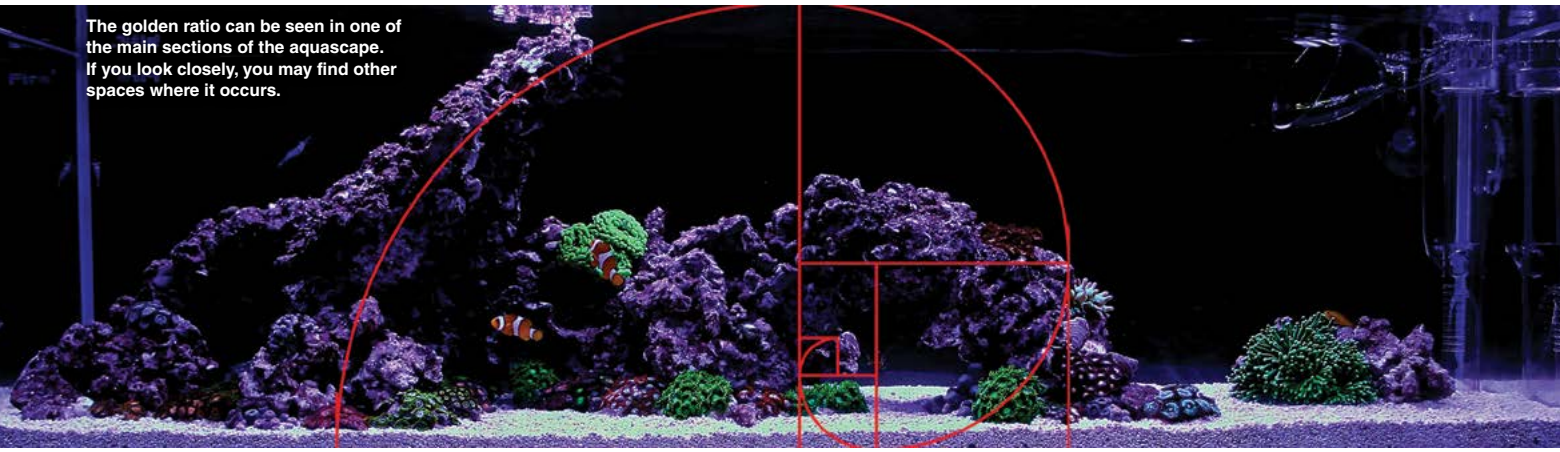
My planted tanks are also featured in the same room.

Size does matter!

When I first started this aquarium in October 2015, I had planned for an LPS (large-polyped stony) and zoanthid Iwagumi aquascape. Since then, it has evolved into what we see today, an SPS (small-polyped stony)-dominated Iwagumi tank. Although much of the rock has been covered, the structures, lines, and shapes are still visible. I like the fact that aquariums can be as dynamic as we want them to be.

Aquariums should be beautiful inside and out. I aquascaped my tank with influences from the planted side of the freshwater hobby. Iwagumi principles of Japanese stone gardens can be seen, and I applied the golden ratio to try to create flow, depth, and scale. The golden ratio is mainly used for composition in photography. It creates a leading line and spirals toward a focal point. Using the golden ratio adds movement to an aquascape, giving the eyes a direction to follow, resulting in a balanced layout. Many people do not realize that this tank is only 35 inches long and 12 inches tall, but a sense of a larger scale is achieved with smaller compact corals and leading lines. One thing to note is that a vision of how a scape looks in the beginning should take into consideration how the corals will look later—aquascape with a visual goal, but understand that aquariums will always evolve as the corals grow and change.

There's a beauty to simplicity. I designed and purchased my aquarium through Fire, an aquarium brand specializing in rimless, optically clear tanks with machine-beveled edges and precise silicone seams. A MAME glass overflow complements the clean lines with simple elegance. Even the way we mount our hardware



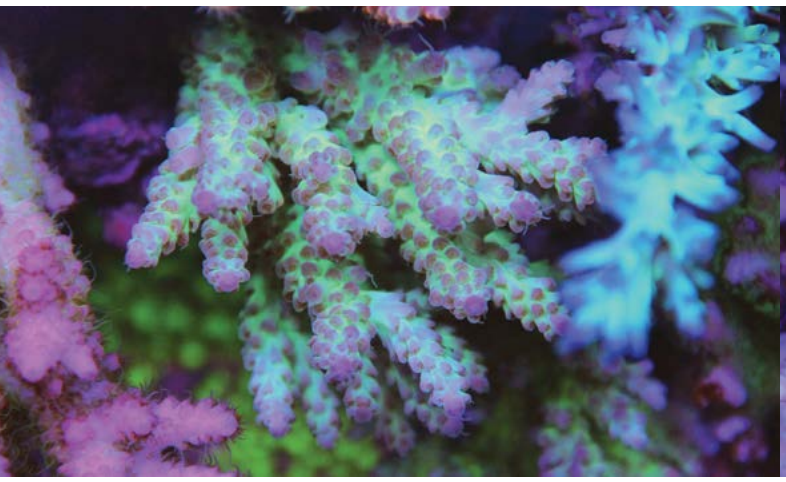
The golden ratio can be seen in one of the main sections of the aquascape. If you look closely, you may find other spaces where it occurs.

can add to the overall aesthetics of the tank. The Maxspect R420r light unobtrusively floats above since I find mounting arms and hoods to be distracting. Allowing for space above and around the tank offers a three-dimensional view. Inside the cabinet is a custom sump made of ultra-glossy white PVC, over-engineered with the skill and craftsmanship of Australian sump builder, Liquid Oasis. Aquariums can be the centerpiece of a home, and the design elements of a system should complement its surroundings.

Pictures only show the product, not the process. To keep this aquarium looking its best, there are strict cleaning procedures I follow fastidiously. My wave maker goes into nutrient-export mode for 2 minutes every hour. I clean the glass every 2 days, and once every 2 weeks, I scrape off any coralline algae. A quick blast of the rocks and sand periodically removes detritus build-up before water changes. Occasionally, I will trim some of the SPS corals to encourage them to grow in the directions I prefer and to prevent them from touching each other. While these things may seem simple, they are very effective if practiced diligently. As for filtration, there is a filter sock, a Bubble Magus Curve 5 protein skimmer, and carbon with GFO (granular ferric oxide) in a single reactor. I give the system a 4-gallon (15%) water change every week as I siphon out detritus from the tank and any debris in my sump. I prefer to keep the filtration system clean since I have seen many tanks where problems such as algae or cyanobacteria blooms arise due to neglected sumps. I challenge anyone who has LARS (lazy-ass reefer syndrome) to try a consistent cleaning routine and see what it will do for his or her tank.

A high coral density depletes nutrients and trace elements from ~26 gallons of water quickly. The challenge for this system is to keep all the corals happy. I feed Reef Pearls and amino acids every night and turn the tank into a coral-food soup. In this mixed-reef environment, I keep corals with different nutrient requirements. As a result, too little food and some corals start to fade or shrink. Too much food and the nutrients spike very quickly in such a small volume of water, causing the SPS to go brown. I've been on both sides of this equation, and it took over 3 months to find the balance people so often talk about. I keep my dKH at 7, allowing for slower growth and brighter colors. In the past few months, I have been experimenting with trace-element dosing using KZ Coral System to help color-up my *Acropora*, and I have noticed positive changes in the pink, blue, and green hues.

Looking back, what started off as a side project to keep me occupied turned into a world of learning and experience that I try to expand each day. The following month after I submitted my planted-tank entry to Japan, I received the news that I had been awarded a "winning work" as the highest-ranking Australian aquascaper. Sadly, I also received the news that Master Amano had left us.



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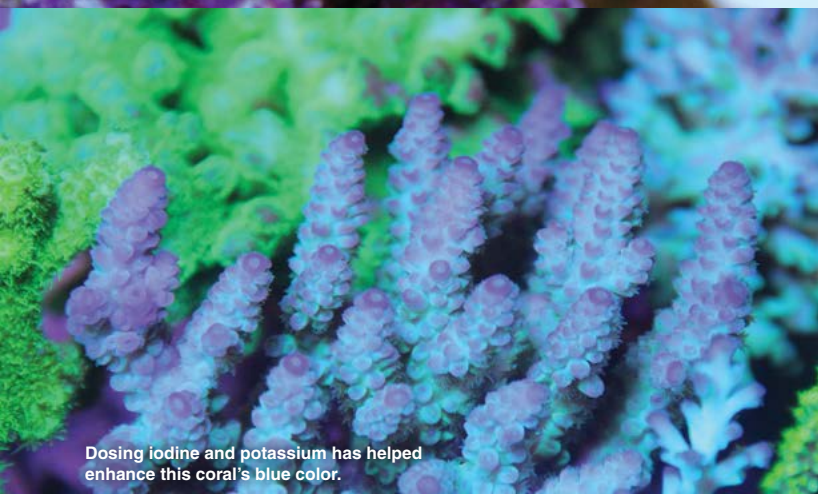
Dosing iron has helped to bring out the green tips on this pink *Acropora*.

This little Platinum Snowflake Clown has now grown into the queen of the reef.



Dosing iodine and potassium has helped enhance this coral's blue color.

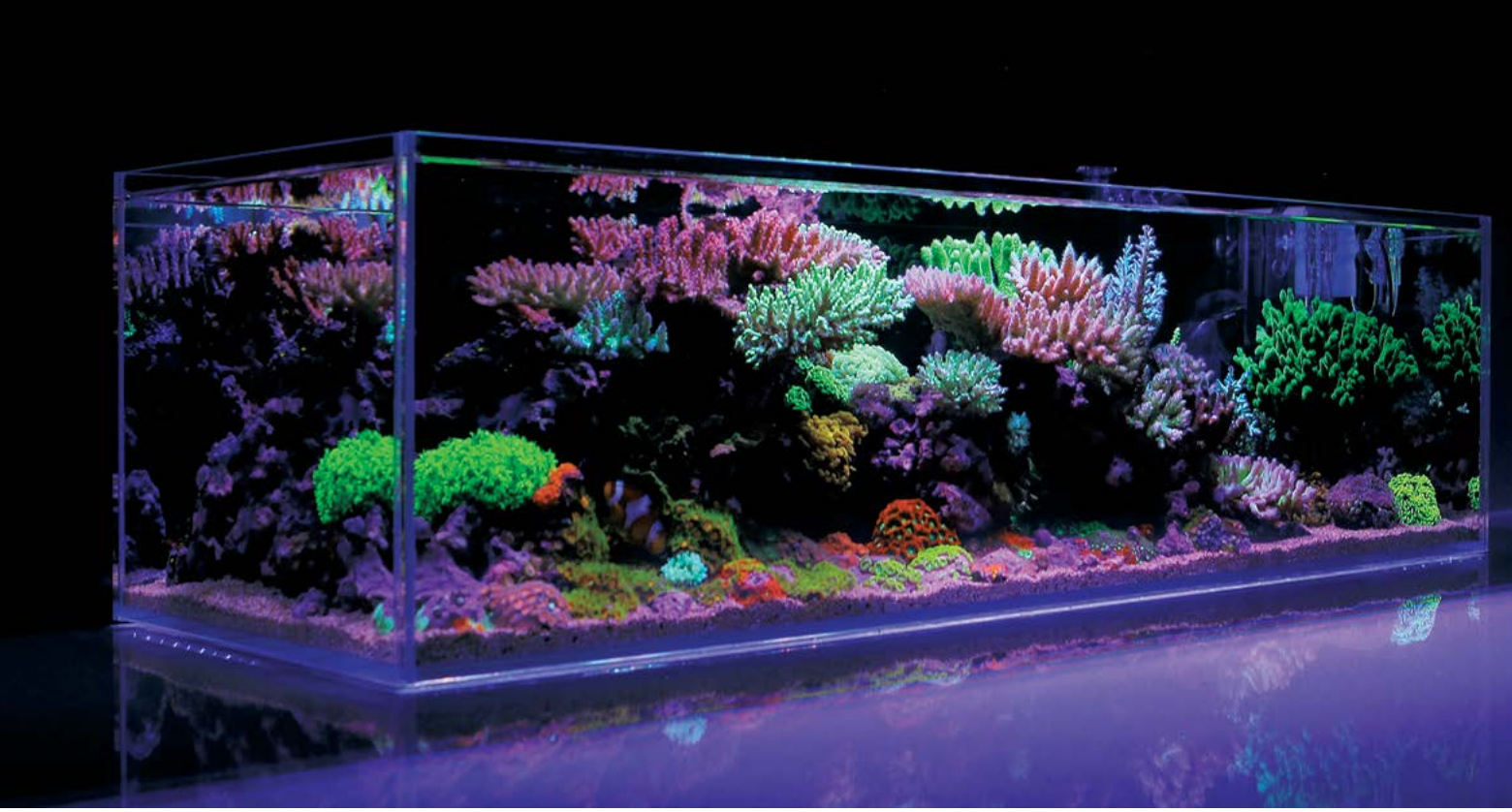
Overwhelmed and in disbelief, I sat down in my living room, surrounded by my aquariums. In that moment, they became more than glass boxes. When I first started aquascaping, my goal was to create my own world in a glass box; now I am reminded of a new world I have discovered and the many people who have helped me get to where I am today.

SYSTEM SUMMARY

Display Tank: ~17 gallons (35 in × 11 in × 12 in)
Sump: ~12 gallons
Lighting: Maxspect R420r 15,000K
Skimmer: Bubble Magus Curve 5
Overflow: MAME Japan
Return Pump: Jecod DCS 2000
Reactor: single chamber with GFO and carbon
Heater: Eheim Jager 150 watt

WATER PARAMETERS

Specific Gravity: 1.025–1.026
pH: 7.9–8.2
Calcium: 420
Alkalinity: 7 dKH
Potassium: 440 ppm
Magnesium: 1400 ppm
Phosphate: 0.009–0.015
Nitrate: undetectable
Temperature: 79.7° F



CORALS

Acropora spp.
Zoanthids
Palythoa spp.
Goniopora spp.
Euphyllia ancora
Green Bubble-Tip Anemone

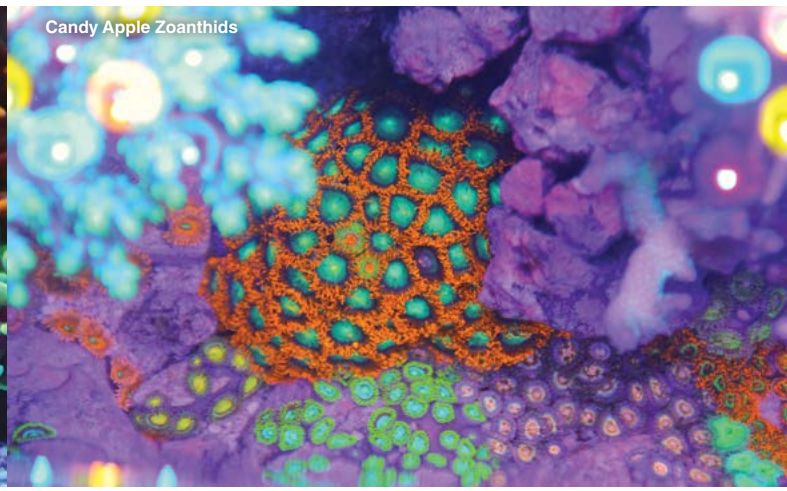
FISH AND INVERTEBRATES

1 Clownfish (*Amphiprion ocellaris*)
2 Platinum Snowflake Clownfish (*Amphiprion ocellaris*)
1 Okinawa Goby (*Gobiodon okinawae*)
1 Leopard Wrasse (*Macropharyngodon ornatus*)
1 Banana Wrasse (*Thalassoma lutescens*)
1 *Tridacna maxima*
1 *Tridacna noae*
2 *Tridacna squamosa*
Hermit Crabs
Turbo Snails

ACKNOWLEDGEMENTS

This aquarium would not be possible without the inspiration I have gained from Master Takashi Amano. He inspired me and many others to bring nature into aquariums; may his legacy and memory live on whenever we rejoice in nature. I would also like to thank my partner, Audrey, who has supported my passion for aquascaping, as well as my family and reefing friends who have enjoyed this aquarium as much as I have.


Euphyllia ancora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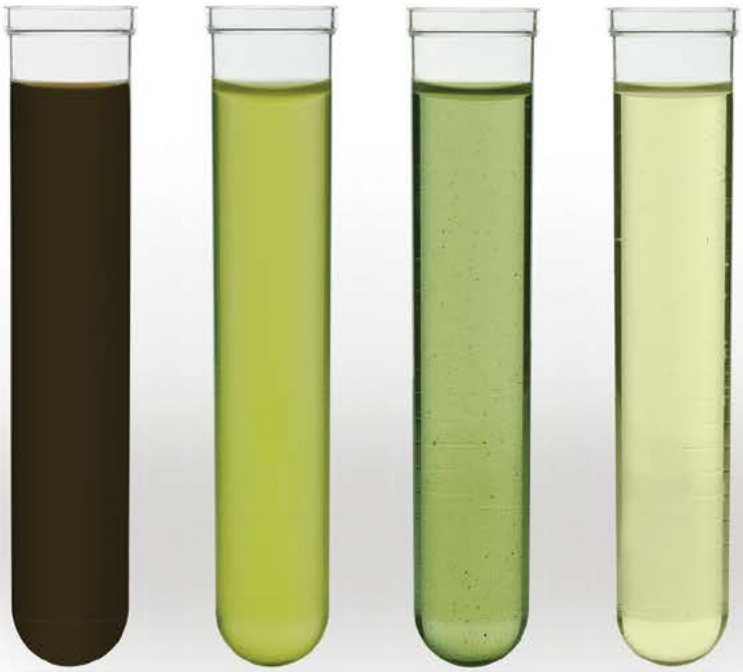

Product:	**Phyto-Feast** Concentrate	**Brand 1** Live Algae	**Brand 2** Live Algae	**Brand 3** Live Algae
Ounces per bottle:	16	15	16	8
Grams of algae per bottle[2]:	**42.18**	2.17	1.04	0.79
Price per gram of algae[3]:	**$0.45**	$9.22	$14.38	$14.69

1) *Pavlova, Isochrysis, Thalassiosira weissflogii, Tetraselmis, Nannochloropsis,* and *Synechococcus.*
2) Wet weight; algae separated by centrifugation. 3) Based on retail pricing.

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