REEF HOBBYIST MAGAZINE

FIRST QUARTER 2016 | VOLUME 10

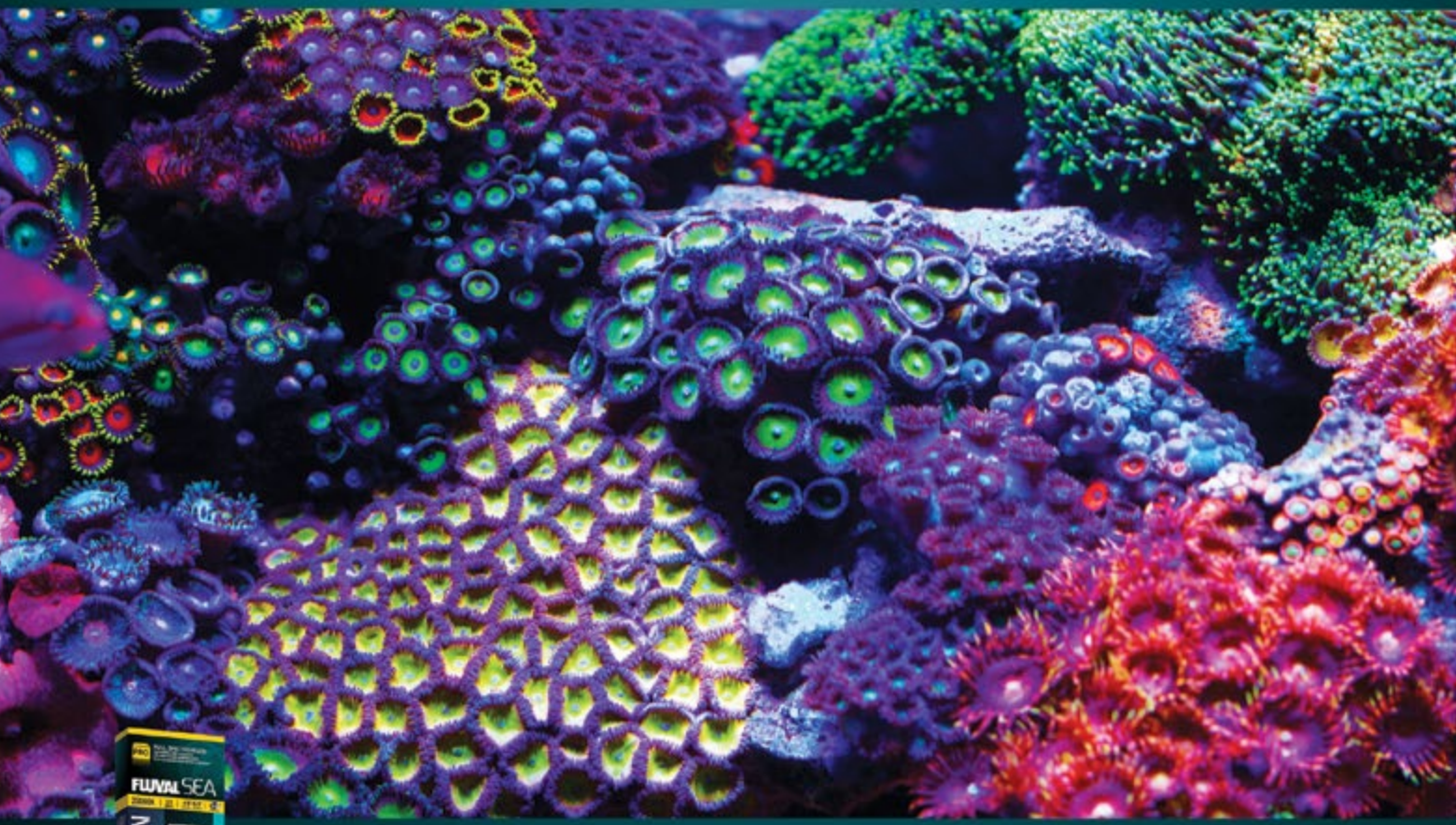
A Guide to Your First Anemone

Feeding Behaviors of Marine Fish

Sun Coral *Success*

MARINE & REEF 2.0

BIGGER. BRIGHTER. BOLDER.



With 6 unique LED types, 4 of which are blue, the Marine & Reef 2.0 performance LED series is specifically designed to immerse your corals in rich full spectrum light, stimulating vigorous growth and vibrant colors. This new and more powerful generation, enhanced with IP67 waterproof engineering, can be mounted directly above the surface for impressive light penetration and efficiency.

NEW

ILLUMINATED TOUCH SWITCH
WITH DIMMING FEATURE

GREATER VISIBLE LIGHT OUTPUT
(LUMENS)

FLUVAL
fluvalaquatics.com

aquavitro®

ultra high capacity **filtration**

purfiltrum™

purfiltrum™ is a unique macro-porous synthetic polymer that removes soluble and insoluble organic impurities from water **5 to 10 times faster and more completely than all other competing products**. It is the highest capacity organic filtration resin on the market **outperforming even Purigen®, binding 10 to 15% more organic material**. purfiltrum™ controls ammonia, nitrites and nitrates by removing nitrogenous organic waste that would otherwise be converted into these harmful chemicals. It polishes water to unparalleled clarity. purfiltrum™ is designed for both marine and freshwater use.

phosfiltrum™

phosfiltrum™ is a specially formulated, high-density, granular ferric oxide (GFO). It will rapidly remove phosphates and silicates from both freshwater and saltwater and will not release them back into your aquarium. It is much harder and consequently much less fragile than other GFOs, so it will not break apart into fine particles in your tank. **It has the highest binding capacity of any phosphate remover on the market, so it will last much longer before it needs to be replaced.** Its distinctive dark brown color identifies it as the premier product in the industry.

Sold exclusively in independent retail stores

AquaVitro® is a premium product line from Seachem Laboratories
1000 Seachem Drive, Madison, GA 30650 • 888-SEACHEM • www.aquavitro.com

FEATURES

6 REEF LIFE OF THE MEDITERRANEAN

Richard Aspinall is a freelance writer and photographer living in Yorkshire, England, specializing in travel, wildlife, and scuba diving. Journey with Richard beneath the Mediterranean to his favorite dive spots. This is an essential article for those interested in reproducing a Mediterranean biotope.

16 SUN CORAL SUCCESS: Q&A WITH A PRO

Ngai On Young is an avid aquarist and photographer from Ontario, Canada, with a special passion for non-photosynthetic corals. Questions about sun corals? Find the answers you need to keep yours shining brightly in this Q&A with an expert-level NPS keeper.

26 A BEAUTIFULLY SIMPLE NPS NANO

Mark Mikina is a Chicago-based hobbyist with 10 years' experience in keeping saltwater aquaria. If you've been looking for a way to keep a small reef tank with minimal maintenance, then this article is for you.

32 UNDERSTANDING THE FEEDING BEHAVIORS OF MARINE FISH

Jason Oneppo has over 25 years of experience in the aquarium industry and has been doing R&D for San Francisco Bay Brand for over a decade. What does that fish eat? How does it feed? Will it eat my corals or other animals? Knowing these answers is critical, and Jason has them right here!

38 ON THE COVER

A GUIDE TO YOUR FIRST ANEMONE

Miguel Tolosa is the author of *Practical Coral Farming*, a how-to guide on growing and selling corals. Even though the popularity of fancy Bubble-Tip anemones has skyrocketed in recent years, they remain a challenge for new hobbyists. Take a look at some amazing new morphs, and get the info you need to succeed with these animals in this comprehensive guide.

Rainbow BTA by Legendary Corals

FIRST QUARTER 2016 | Volume 10

ANNOUNCEMENTS

- Care to share your breeding or husbandry success with the world? We are always looking for interesting articles to share with our readers. Email your ideas to us through the "Contact Us" tab on our website.
- Hard copy subscriptions are available to hobbyists in the United States! Scan the QR code below or visit us at www.reefhobbyistmagazine.com to sign up.

RHM-SPONSORED EVENTS

(latest issue available at these events except in Guangzhou, China)

- **Cincy Reef Frag Swap:** January 16, West Chester, OH – cincyreef.com
- **C.A.R.E Annual Frag Swap:** February 6, Cincinnati, OH – care4reefs.org
- **Guangzhou International Aquarium Show:** March 18–20, Guangzhou, China – fishgz.com
- **Reef Currents:** March 19, Houston, TX – reefcurrents.org
- **Reef-A-Palooza Orlando:** April 23–24, Orlando, FL – reefapaloozashow.net

DIGITAL & HARD COPY SUBSCRIPTIONS

Scan this QR code to sign up for our free digital subscription, which gives you full access to archives on our new website. You can also sign up for our new hard copy subscription for home delivery.

WANT RHM IN YOUR STORE?

Increase your store's foot traffic by offering *Reef Hobbyist Magazine* to your customers! We educate hobbyists on new products, husbandry techniques, and livestock. Plus, we never publish e-tailer ads! Contact one of our distributors below or email us through the "Contact Us" tab on our website to get stocked.

- A&M Aquatics – www.amaquatics.com
- All Seas Marine – www.allseaslax.com
- DFW Aquarium Supply – www.dfwaquarium.com
- Exotic Reef Imports – www.exoticreefimports.com
- Pacific Aqua Farms – www.pacificaquafarms.com
- Quality Marine – www.qualitymarine.com
- Reef Nutrition – www.reefnutrition.com
- Segrest Farms – www.segrestfarms.com

COME VISIT OUR NEW WEBSITE!

www.reefhobbyistmagazine.com

- Find full access to RHM archives.
- Download any issue in PDF for your computer or mobile device.
- Sign up for a hard copy subscription or FREE digital subscription.
- Watch exclusive videos and shows.
- Search for articles by topic, author, or keyword.
- www.facebook.com/reefhobbyistmag

RHM STAFF

President Harry Tung
Executive Editor Jim Adelberg
Art Director Yoony Byun
Advertising@rhmag.com
Photography Advisor Sabine Penisson
Copy Editor Steven Tanamachi
Graphic Designer Dave Tran

COMMENTS OR SUGGESTIONS? Contact us on our website!

KORALIA
THIRD GENERATION

Since 1984, Hydor has specialized in design and production of high-tech aquarium products and is continuing the tradition of innovation by introducing the newly designed Koralia Third Generation circulation pump line for aquariums.

Dual Magnetic Support
New patented Dual Magnetic Support System (DMSS) allows the user to position the Koralia freely inside the aquarium. The pump can pivot in virtually any direction to guarantee flow where it is needed. Enhanced with vibration absorbing silicone for silent operation.

Energy Efficient
New motor design, new propeller profile, new intake spiral grid: the new Koralia Third Generation is state of the art in energy efficiency: only 1 Watt per 275 GPH flow.

Three Unique Attachments
Koralia Third Generation is customizable in flow and protection - **Flow Diffuser** *for a wider and gentler flow* - **Small Fish Guard** *for protection of smaller fish and shrimp* - **Medium Fish Guard** *for protection of small to medium fish and shrimp*

HYDOR USA Inc.
Phone 916-920-5222
e-mail: hydor.usa@hydor.com
www.hydor.com
Koralia is designed and made in Italy

Flow rates vary by attachment



Model	Watts	Free Flow	Small Fish Guard	Medium Fish Guard	Diffuser
Koralia 1350	5.5	1350 gph	950 gph	1100 gph	1050 gph
Koralia 1950	6.3	1950 gph	1250 gph	1500 gph	1350 gph
Koralia 2450	8.5	2450 gph	1600 gph	1850 gph	1750 gph

Reef Life of the Mediterranean

RICHARD ASPINALL

The world's largest inland sea, as the name implies, is in the "middle of lands," sitting in a wide basin between the continents of Europe and Africa. It is as central to Old World geography as it is to Old World history. The Greeks, the Phoenicians, the British, Nazi Germany, and just about every regional power over the last few thousand years have scattered quite a number of interesting shipwrecks across the Mediterranean. These cultures have been responsible for a massive number of harbors, quays, lighthouses, fortifications, and the rest of the associated infrastructure that accompanies a marine-based trading and/or military civilization.

Let's have a quick look at some facts. The Med covers an area of nearly one million square miles. Its opening into the Atlantic Ocean at the Straits of Gibraltar is roughly 9 miles wide, separating Spain and Morocco. The currents generated through the Straits are quite interesting, being mainly a subsurface outflow to the west, but an eastward inflow at the surface. The other connections to the Black Sea are ecologically important but better known for their historical significance. Among these is the relatively recent connection to the Red Sea via the Suez Canal, which allows water and species (covered later) to pass into the Mediterranean.

The Mediterranean is littered with island chains and archipelagos of significant interest, both biologically and to the hordes of tourists that visit here. The Ionian and Aegean regions (also referred to as seas) contain scores of islands that are part of a complicated landscape both above and below the water, created in significant part by numerous earthquakes over the centuries. Some sources suggest that the massive volcanic eruption on the Island of Santorini (approximately 3,600 years ago, which effectively ended the Minoan civilization) may be the origin of the Atlantis myth.

The Med is often thought of as a poorer cousin to other seas in terms of biodiversity, yet studies have shown as many as 17,000 species occurring within it, including 650 fish species, over 2,200 species of crustaceans, and over 750 cnidarian species. These figures show that despite prevailing assumptions, the Med is species rich and has many interesting habitats, some of which we will now look at in more detail.

The seagrass *Posidonia oceanica* is estimated to cover about 3 percent of the Mediterranean basin and is endemic to the region. It provides a very beautiful habitat and can create wonderful undersea landscapes that are fascinating to explore as a diver or snorkeler. *Posidonia* leaves are quite long (almost 5 feet in length) compared to other sea grasses. These plants show seasonal variation and range from vivid green during their growth phase to a darker form as the leaves degrade in the cooler months. This is when they best show the large amounts of encrusting life on their dying leaves as those leaves bleach, eventually leading to a stark, monochromatic underwater tableau.

Within these seagrass beds, a broad range of species thrive, including the huge bivalve mollusk, *Pinna nobilis*. This species is a Mediterranean endemic and can grow to over 4 feet tall. Sadly, and

Shallow *Posidonia* bed

Complex, calcareous reef

despite strict protection, this animal is under threat of extinction due to modern fishing practices and the loss of seagrass beds. Living within the *Posidonia* beds are a wealth of small fishes, such as wrasses, and grouper relatives such as combers. On the sea floor, a complex matrix of coralline algae and sponges create a rich habitat for calcareous tubeworms, crustaceans, echinoderms, and the rest of the tiny critters that constitute this biome and get biologists so very excited.

ROCKY SHORES

For most people who visit the Mediterranean, the easy-to-reach shorelines become familiar through rock pooling, snorkeling, or scuba diving. The Med is replete with sheltered bays, jumbles of rocks, and simple caves that are easy to explore and which all have their own fascinating assortment of life.

Any swim in the Med, once you're away from the beach, will reveal shoals of fish, such as the ever-present silver-sided breams, and the occasional barracuda in areas where currents and smaller fish congregate. One fish that's present in very high numbers is the damselfish, *Chromis chromis*. Like its tropical cousins, this species starts out cute and attractive and then becomes dull-colored and territorial—a story many aquarists may have learned to their dismay.

While the rocky shallows host some interesting shoaling fish, I prefer these regions for the species that live closer to the substrate, and

Chromis chromis juvenile

I always enjoy a chance encounter with a Moray or an octopus—both quite common and often found staring out from their crevices, hoping I'll go away.

As with any complicated environment, the harder and closer you look, the more life you'll see. And while I'm often photographing the big stuff, I also get to see some of the smaller creatures too, and I find some of these small fish to be quite attractive.

The Striped Blenny (*P. rouxi*) is a particular charmer, growing to only 8 centimeters and sporting the typical blenny cirri; it is a gorgeous little fish. It is shy and secretive but would make an excellent aquarium specimen. Similarly sized are the three common Triplefin species from the region that have superb coloration but are surprisingly hard to spot when they're hiding amidst a complicated

Tripterygion melanurus minor

Parablennius rouxi

Snakelocks anemone and *Gobius bucchichi*

T. delaisi

T. pavo adult

background of sponges and calcareous algae. *T. melanurus minor* is particularly cryptic, while *T. delaisi* takes the crown for Triplefin beauty. The electric-blue edging on its dorsal fin is particularly stunning. These fish occupy small territories and would adapt well to aquarium life.

In slightly shallower areas, often quite close to shore, visitors can see one of the anemone species found in the Mediterranean. The Snakelocks anemone (*Anemonia viridis*) is very common and quite attractive with a greenish tinge and occasionally purple tips to its tentacles. Other anemone species are found here, but this is by far the most common in my experience. In some locales, they are gathered for human consumption.

This habitat also hosts one of the most attractive fish of the Mediterranean region and one that rivals any tropical species, the

Aquaforest®

PROVEN RESULTS

All You need to have an amazing tank!

Master Your reef with our products:

MARINE SALTS
Probiotic, Reef and Sea salts.

REEF PROBIOTICS
Unique method. Microbial and probiotic bacteria communities improve bio filtration.

MICROELEMENTS
For coral's enhancement to increase growth and coloration.

SUPPLEMENTS & FOODS
Supplements, food and vitamins for amazing colors.

WATER CHEMISTRY
Powder components and liquid solutions to keep natural chemistry balance.

FILTRATION MEDIA
An essential group of products for biological and chemical filtration to maintain Your water quality.

AQUASCAPING
Safe synthetic eco-reef rock and adhesives to create Your dream looking reef.

Wholesale enquires:
www.deepwateraquatics.com

Shipwrecks offer several habitat types in one brief dive.

Ornate Wrasse. *Thalassoma pavo* can reach 20 centimeters and starts its life as a playful and lively lime-green fish that shelters within *Posidonia* beds. As it matures and reaches its terminal phase, its coloration certainly packs a punch. At one time, dive centers would regularly smash open urchins to attract these and other fish, a practice that is now rare as divers become a little more conservation minded.

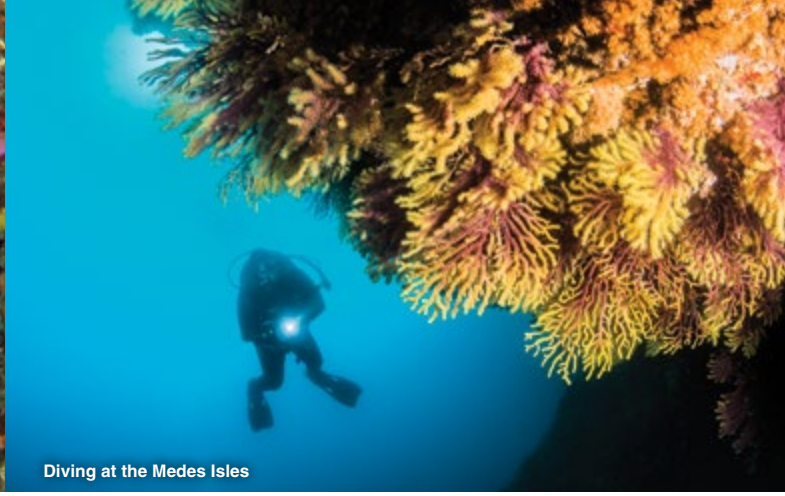
SHIPWRECKS

While not a specific natural habitat, shipwrecks offer an amazing opportunity to encounter several habitat types in one brief dive. Think of the holds as caves and the superstructure as a structurally complicated reef and you get the picture. Ancient wrecks are usually well protected, and diving is limited or banned, but occasional amphorae from ship cargoes can be seen. These, however, are often at risk from theft and anchor damage. The more recent steel and iron wrecks are much more biologically interesting.

Their decks can harbor a wealth of predatory fish preying on the shoaling fish that are attracted to the shelter the wrecks afford. And within the holds and companionways, one can often find deep-water species that are particularly interesting. The bright Red Cardinalfish (*Apogon imberbis*) is one of the most attractive of its genus. It is active at night, relying on its red pigmentation to render it black and nearly invisible in its preferred deep-water and low-light conditions.

Along with the Red Cardinal, one frequently finds my favorite Mediterranean fish, the Swallow-Tail Anthias (*Anthias anthias*). All aquarists are familiar with fishes from the subfamily Anthiinae, but this is the fish that gave its name to all the others during the great taxonomical list-making of Linnaeus himself. This fish is spectacularly colored (when correctly illuminated) with long, tapered pelvic fins and delicate markings around the head. Despite the fact that they are quite common, they are deep-water

Anthias anthias at over 40 meters



Diving at the Medes Isles

fish and not often seen by most snorkelers or everyday scuba divers unwilling or unable to reach their depth.

The Mediterranean offers some world-class diving, with some environments that are second to none. In my experience though, these tend to be deep and limited to areas with high currents that allow filter feeding animals to prosper. These high-energy currents create remarkable undersea habitats. One such location is the Medes Island group off the Catalan coast near Barcelona. Rising from the sea floor, these rocky pinnacles host astounding growths of sea fans (*Eunicella* and *Paramuricea* spp.), Gorgonians (*Lophogorgia sarmentosa*), and soft corals such as *Alcyonium palmatum*, along with a rich assortment of segmented worms, tube worms, cup corals, and bryozoans. Indeed, in these regions, one starts to think the Med is capable of challenging any tropical reef in terms of the abundance and color of the wildlife.

It is also at these depths that anthias in some locations can aggregate in such large numbers that the similarity to the tropics is even more persuasive. On one recent dive trip to the Aegean, I was able to explore an area I'd never before dived, where an underwater cliff, bathed in current, supported an ecosystem as rich as any tropical coral reef with a biomass to match, I would imagine.

This site only really stood out once I reached 35 meters or more, deeper than most divers and dive centers tend to venture. At 40 meters, it truly came alive, though my gas supply didn't allow me to stay long at that depth. I had never seen any place quite as

Coris julis juvenile

Hermodice carunculata

Leptopsammia pruvoti

biologically rich in the Med, and I can only assume this site is not unique, with other deep-water locations being equally rich in life. Returning the next day with a macro lens mounted to my camera allowed me to spend a happy dive shooting nudibranchs and fish portraits, and I can only hope to return to further chronicle this area.

THREATS TO THE MEDITERRANEAN

The marine life of the Mediterranean has been hit hard over the last few decades. Pollution and overfishing have vastly reduced

Serpula sp.

the numbers of all creatures, from Loggerhead turtles to tuna. Some areas have been set aside for conservation by limiting fishing, but these are woefully inadequate and not always well policed.

A more recent threat is that of introduced species, of which over 650 have been recorded. Of particular note is *Caulerpa taxifolia*, which is thought to have been released from an aquarium in Monaco in the 1980s. It is a deep irony that this "killer algae" was released from an aquarium owned by Jacques Cousteau's Oceanographic Museum in the small but wealthy principality. The plant wasn't originally considered a threat, but it is now causing significant ecological changes and damaging fisheries in areas where it has taken a foothold by smothering the native *Posidonia*. I understand this Mediterranean *Caulerpa* strain is now also found in Californian and Australian waters.

Also of interest are the so-called Lessepian species. Named after Ferdinand de Lesseps, who we'd term the Suez Canal's Project Manager in modern parlance, Lessepian species are those that have traveled from the Red Sea to the Mediterranean. The flow of species has been mainly one way due to prevailing currents. Around 300 species are thought to have made this migration and survived

in the eastern Mediterranean. This includes over 50 species of fish, while only 3 species of Mediterranean fish are thought to have made the journey to the Red Sea. I hope you enjoyed this little tour of the Mediterranean and that this piece has shown you that the Med still retains the ability to surprise and delight.

References:

www.journals.plos.org/plosone/article?id=10.1371/journal. pone.00

www.photomazza.com/?Thalassoma-pavo

www.tandfonline.com/doi/df/10.1080/11250009809386801

AlgaGen

Often Imitated

Never Duplicated

Coral Smoothie ™

Phyco Pure ™

- Zooxanthellae
- Reef Blend

AlgaGen PODS ™

- Tisbe - ReefPODS
- Pseudodiaptomus
- Parvocalanus
- Tangerine
- Acartia

Live Feeds Program

NEW

Live Coral Food

- Apocyclops
- Euterpina

Feed The Frenzy

AlgaGen LLC
www.algagen.com
PO Box 1734 Vero Beach, Fl 32961
PH (772) 978.1395

NGAI ON YOUNG

Sun Coral Success: Q&A with a Pro

Sun coral is a general term describing different species of large-polyped corals usually in the genus *Tubastraea* or *Dendrophyllia*. The individual polyps resemble a sunflower with a circular head and several rows of short tentacles surrounding the mouth. They are often brightly colored, and a large colony can easily serve as the centerpiece in a reef aquarium. They are non-photosynthetic and do not derive any sustenance from light and therefore have to be fed regularly.

How can I tell what type of sun coral I have?

There are 6 species of *Tubastraea (T.)* and over 80 species of *Dendrophyllia (D.)*, so identification can often be challenging. The chart on the next page provides some guidance in identification for the commonly collected varieties. Note that color is not considered a distinguishing characteristic for different species. Instead, the skeletal structure and basic growth pattern is what is used to classify species.

What should I look for when I purchase a sun coral?

A healthy specimen should have tissue throughout the base where the polyps emerge. Corals that have not been fed for a long time will have tissue recession at the base of the coral, and the skeleton underneath will start showing. Stay away from specimens that have significant tissue recession since they may be too far gone to recover. Also, if the skin of a particular coral looks like it's peeling off of the skeleton, it is a sign that the coral is suffering from a bacterial infection.

What do you feed sun corals, and how do you feed them?

Any meaty items such as brine shrimp, *Mysis* shrimp, blood worms, or finely chopped shrimp will be eagerly consumed by sun corals.

Probably a *T. taguensis*, which has longer tubes that all appear to emerge from the same point in the base (like a sea urchin)

SUN CORAL IDENTIFICATION

Species	Tissue Color (not polyp)	Location	Shape
T. coccinea	orange, yellow-orange, orange-red, pink-red	everywhere	bushy with short polyp tubes (bodies) that are densely spaced
T. micrantha	black, dark green	Pacific and Indian Ocean	tree-like branching tubes
T. diaphana	yellow, orange-red, black	Pacific and Indian Ocean	tree-like branching tubes
T. floreana (endangered)	bright light pink	Eastern Pacific (Galapagos only)	bushy with short polyp tubes
T. faulkneri (not very common)	orange, red-orange, pink-red	Pacific	bushy with short polyp tubes, polyps are very sparsely spaced
T. taguensis	yellow, orange	SW Atlantic and Eastern Pacific	singular longer polyp tubes branching from base
D. arbuscula	yellow polyp, orange skin	Pacific and Indian Ocean	tree-like branching tubes
D. fistula	yellow, yellow-orange	Pacific and Indian Ocean	bushy with short but large polyps (hence the moniker Fathead Dendros)
Cladopsammia gracilis	pink, pink-orange	Pacific	tree-like branching tubes (prefers colder temperatures)

Chart Reference: S. Cairns, "Species Richness of Recent Scleractinia," 1999; De Paula and Creed, "Two Species of the Coral Tubastraea in Brazil: A Case of Accidental Introduction," 2004; *Annals of the South African Museum*, 1993

It is good for these corals to have a variety of foods in their diet. If you are using frozen foods, be sure to warm them to near room temperature before feeding. The best way to feed these corals is to use a feeding apparatus that squirts—like "Julian's Thing." If you are using this device, cut the nozzle to open it up a bit so that the food can be sucked in easily. Make sure each polyp gets some food. Every polyp operates as an individual coral with the ability to draw nutrients from the base. When any polyp is starved, it will start

Close-up of a *Dendrophyllia*

This well-fed *T. micrantha* polyp is swollen after ingesting brine shrimp.

An uncommon T. *diaphana.* Note the tree-like growth where polyps emerge from other polyps, much like *D. arbuscula.* This species has hard calcium tubes with pale yellow-orange tissue and can be challenging to maintain.

to draw nutrients from the base, and generally this is where tissue recession starts.

How often do you have to feed sun corals?

Daily is ideal for healthy specimens. The minimum should be every other day for good maintenance. For sun corals that are recovering from tissue recession, daily feeding is essential.

Can you overfeed your corals?

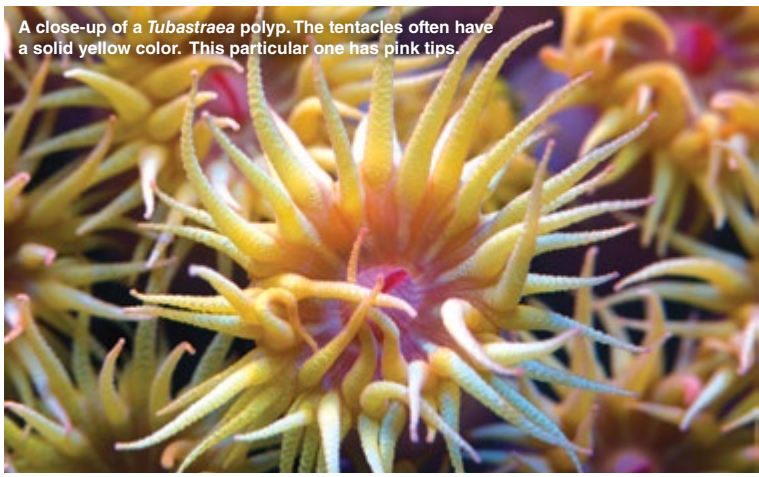
Generally, the answer is no. But if the food that the coral ingests begins to rot before it is fully eaten by the coral, there is a risk of bacterial infection. In that case, you will see the flesh from the coral start to tear away from the skeleton. This can even happen to otherwise healthy corals. Corals with larger heads (like *fistula*) tend to be more susceptible to these infections.

Do these corals require a lot of flow?

Yes, strong flow will encourage polyp extension. Randomized flow is preferable.

Do I need to hang these corals upside down? Where should I place them in the tank?

They don't need to be hung upside down, and doing so will make them harder to feed. Make sure they get a lot of flow, and put them somewhere you can easily feed all the different polyp heads.



A close-up of a *Tubastraea* polyp. The tentacles often have a solid yellow color. This particular one has pink tips.

A *T. coccinea* colony displaying bushy growth and short polyp tubes. The actual polyps may extend beyond the hard calcium tubes (as seen in the photo), but this species is identified by the short, hard calcium tubes.

Close-up of a colony of *Tubastraea micrantha* (Black Sun coral). Notice that the polyps can be dark green in color (vs. black).

Do these corals need pristine water conditions?

Generally, the answer is no. These corals seem to thrive even in higher nitrate and phosphate environments. Most NPS (non-photosynthetic) tanks tend to run higher in nitrate and phosphate than other reef tanks because of the volume of food that is regularly introduced into the system.

How does carbon dosing affect sun corals?

Although not directly harmful to these corals, carbon dosing can cause cyanobacteria outbreaks. Sun coral colonies tend to attract cyanobacteria growth, especially in lower-flow environments.

How much and what type of lighting do sun corals require?

Because these corals are non-photosynthetic, they have no specific requirements for lighting. High-intensity lighting will not harm the corals except that it may cause unwanted algae growth on exposed skeleton or rock. From an aesthetic perspective, sun corals do not require actinic lighting to bring out their colors (unlike small-polyped stony corals). However, full-spectrum LED lighting can really highlight their aesthetic appearance. Because of the inherent colors of the corals, red and violet hues can create a spectacular visual display.

Are the care requirements the same for the different species?

Yes, with two notable exceptions. *T. micrantha* (Black Sun coral) requires more regular feeding (close to daily) to ensure there is no tissue recession. *Cladopsammia gracilis* tends to thrive in lower temperatures.

Can you put different colonies of sun coral side by side? What about with other corals?

My experience has been that sun corals do not bother each other and can be placed in close proximity. Larger cousins of sun corals, like *Rhizotrochus, Monomyces*, or larger *Balanophyllia*, can sting or bother sun corals to the point of not opening if they are touching. Generally, sun corals do not sting other corals and will be the losers if any contact is made with stinging neighboring corals. Very close proximity to leathers may affect sun corals due to the leathers' release of chemical toxins.

What types of fish and invertebrates are compatible with sun corals?

Reef-safe fish are generally compatible. Larger fish may be a concern because they may try to take food from the coral and damage the polyps in the process. Shrimp will usually try to steal food from sun corals.

Is there any way to keep fish and shrimp from stealing food from a sun coral's mouth?

Fish are a lesser concern because they can be easily shooed away. Shrimp, on the other hand, are much more persistent. Some techniques you can try include distracting the shrimp with some food in a different part of the tank or using a cut 2-liter plastic bottle to cover the coral either after you feed it or while feeding it through the mouth of the container.

My sun corals won't open up. What should I do?

1. Increase the flow to the coral to see if that induces them to open.

2. Use a "prompter" food to induce the coral to open. Angelfish food or ground-up *Mysis* are effective prompter foods. Stop the flow in your tank,

A full-tank shot of my NPS tank setup. At the bottom left is my collection of *Rhizotrochus typus*.

Your T5 Will Never Be a T5 Again

E5™

Retro Series

Unique Benefits

3-Year Warranty

Lasts up to 8 Years

45% Power Savings

Amazing Colors

- Warm Daylight
- Daylight
- Cool Daylight
- Blue Pop™ (~450nm)
- Marine Pink

WINNER MARINE DEPOT BEST OF AWARD 2015

EUROQUATICS® A GAVITA COMPANY

euroquatics.com

squirt the prompter food at the coral, and wait a few minutes before resuming the flow.

3. If they still won't open after trying tips 1 and 2, remove the coral from the tank and put the coral in a plastic container of tank water so that it's fully submerged. Create some water movement in the container with an airstone. Then add the prompter food to induce it to open. Using a plastic container allows for a greater concentration of food in the coral's immediate vicinity. Don't leave the coral in the container too long since dense feedings of frozen food will foul the container's water fairly quickly.

4. Check on the coral after the lights are off to make sure it isn't opening once it gets dark.

5. Use an airstone to increase the tank's oxygen level.

6. Repeat tips 1–3. Sometimes, it will take weeks for a particular coral to open. The branching varieties tend to be tougher to get to open.

7. Use brine shrimp only for the initial feeding. These corals respond very readily to live adult brine, but unless heavily enriched, it's a poor staple diet.

My sun coral only seems to open up at night. What can I do?

Tubastraea naturally feed at night, but you can attempt to train your corals to feed during the day. This means that you will have to use

Probably *T. faulkneri*. The polyps are more sparsely spaced than *T. coccinea*.

prompter foods to induce the corals to open during the day and feed at that time. If you only get one or two polyps to open, just feed those and wait about 15 minutes to see if the entire colony opens up. Try to do the daytime feedings at the same time every day.

Do I need to worry about calcium and alkalinity levels?

No more so than with other LPS (large-polyped stonies). Regular water changes should be sufficient to replenish what is required.

How fast do sun corals grow? What other means of propagation are there?

Growth is dependent on the amount of food consumed. *T. coccinea* and *E. fistula* are probably the fastest growers. The bushy-type

Close-up of an *E. Fistula* polyp. The nematocysts on the tentacles are adept at collecting food.

sun corals grow by encrusting new rock and sprouting new heads at the base. The branching varieties sprout new heads from the branching tubes. When the coral is in the process of sprouting a new head, it is not uncommon for them to stay closed for a few days. These corals also reproduce sexually with sperm and eggs, which are expelled from the mouth of the coral. One other means of propagation is that occasionally, the coral will eject small pieces of flesh that will anchor themselves onto the rock or substrate. These will grow into small polyps if properly cared for.

Overall, sun corals are easy to maintain, hardy, and generally pest free. They can be a colorful addition to any reef aquarium provided you are prepared to spend the few minutes required to feed them on a regular basis.

The commonly collected *T. coccinea*. The hard tubes of the polyps are short, and the coral simply encrusts along the rockwork. The colors of this species can range from yellow to reddish-orange.

HYDRA HD
SERIES

Is That A Controller In Your Pocket?

Yes it is! With Ai-Fi, the Hydra HD series uses built-in Wi-Fi to control your lights with the devices you already own. Compatible with iOS, Android, or web-connected computers.

Introducing Vectra™

The World's Smartest Return Pump

learn more at ecotechmarine.com

ECOTECH® MARINE
www.ecotechmarine.com

A Beautifully Simple **NPS Nano**

MARK MIKINA

My name is Mark Mikina, and I live in Chicago, Illinois. For as long as I can remember, I've always had an aquarium. I started with a goldfish in a bowl, and a few years later, I found myself setting up a nice 125-gallon discus tank.

My adventure with saltwater began while I was visiting a friend. Upon seeing his beautiful mixed reef, I was hooked instantly. I've had a few aquariums since and am proud to have had my old SPS (small-polyped stony) reef featured in a couple of online aquarium forums.

Not long ago, I bought a new house and was forced to take down my reef during the move and renovations. Not having to constantly worry about my SPS corals and getting a break from virtually daily maintenance was something I enjoyed, but I also missed the hobby a lot.

I had planned to set up my SPS tank again soon, but at the time, I wanted to try my hand at something small and simple that wouldn't take too much of my time.

I decided to set up a 12-gallon nano tank that I already owned. I placed this tank on a bookshelf that was mounted to the wall. Three braces that were rated for 100 pounds each were used to make sure the shelf would support the weight of the tank with no chance of failure. I estimated the weight of the full tank with sand, rock, and equipment to be approximately 110 pounds.

SYSTEM PROFILE

DISPLAY: Mr. Aqua 12 gallon (36" × 8" × 9")
LIGHT: Petco-brand LED fixture
FILTRATION: AquaClear 50 hang-on-back (HOB) filter, activated carbon, Purigen, and Siporax media
WATER FLOW: Jebao RW-4 powerhead
SKIMMER: Macro Aqua M-50

Porcelain crab

NPS (non-photosynthetic) corals captivate me, and so I decided to keep those—mainly LPS (large-polyped stony) corals such as sun corals and dendros. I love how they display such bright colors and are relatively easy to keep, provided that you feed them on a regular basis. The tank is kept without a heater, and the temperature is a constant 72° F. I notice that my corals do really well at this lower temperature and stay open most of the time. Fish are also not bothered by this temperature and are active and healthy. Lighting is very dim, which is good for this type of tank, not allowing algae to take hold in the high-nutrient environment.

MAINTENANCE

This tank is very easy to take care of, and this was one of my top priorities when setting it up. I spend about 5 to 10 minutes daily on maintenance and feeding. I empty the skimmer cup every day and also feed my corals with various frozen and dry foods daily. I do a 5-gallon water change and clean the filter media weekly, since some food does get pulled in there. I change carbon and Purigen as needed. Dosing is not required, since large water changes replenish most of the depleted microelements. Topping off for evaporated water is done manually every evening.

Dendrophyllia

Balanophyllia

I take every precaution not to introduce any *Aiptasia* into my tank. With such a small water volume and so many feedings, it would devastate my nano in no time. I started with dry, ceramic rock, and every new coral is inspected thoroughly and detached from any live rock it may be mounted on.

WATER PARAMETERS

Temperature: 72° F
Nitrate: 10 ppm
Phosphate: 0.5 ppm
Calcium: 420 ppm
Alkalinity: 8 dKH
Ammonia: 0 ppm

Branching dendro

Introducing a New Masterpiece in Aquarium Craftsmanship.

We've taken aquarium engineering to the next level with our Crystaline™ trimless, low-iron, crystal clear glass tanks. The clean lines of the black siliconed edges and black back are complimented by our sleek, modern stands made of real maple wood offered in 6 color stain options.

PLANET AQUARIUMS

For more information visit:
www.planetaquariums.com


Electric scallop


Sun coral and dendro

FEEDING

Feeding is very important with NPS corals since the only way they get their energy is from food. Sun corals and dendros prefer bigger pieces of food, so I feed them mostly frozen *Mysis*, bloodworms, and brine shrimp. They are fed every other day, morning and evening. I feed small particle foods and phytoplankton to the gorgonians; these filter feeders are fed 3 to 4 times daily. Some of the bottled and dry foods I use include Oyster Feast, Phyto Feast, Marine Frenzy, and Reef Roids.

During feeding, I turn off all equipment and spot feed each coral. After feeding, I let the display sit without water movement for about 10 minutes. Then, I turn my powerhead back on to circulate food in the display for an additional 30 minutes. After that, I turn the filter and skimmer back on. This strategy results in more food being eaten and less food sucked into the filter.

FILTRATION

The AquaClear 50 filter is filled with a bag of carbon and a bag of Purigen. Also, a handful of Siporax media is placed inside the chamber, allowing for more surfaces for bacteria to colonize and help with the nitrification process. I found Siporax to be very useful early on when I kept SPS corals with a minimal amount of live rock. I expect I'll use Siporax in all my reef tanks going forward.

My HOB skimmer does a great job of removing a lot of nasties from the water, producing about a quarter of a collection cup of dark, smelly skimmate every day. This lets me get away with only weekly water changes, although they are close to 50% of the tank's volume. I can see right away when I need a water change just by


This nano reef is thriving in just a 12-gallon tank.

Balanophyllia and Tailspot Blenny

Tiger Goby

looking at my corals. As soon as they stop opening, I know there is too much nutrient buildup in the water.

In the near future, I want to set up a bigger tank with only NPS corals, but for now this little nano gives me a lot of pride and joy and most importantly doesn't require a lot of work.

FISH

- ORA Masked Goby
- ORA Tiger Goby
- Neon Goby
- Tailspot Blenny

INVERTS

- Electric scallop
- Staghorn crab
- hermit crab
- porcelain crab
- (3) *Nassarius* snail

CORALS

- (2) *Dendrophyllia fistula* (Fathead Dendro)
- (4) sun coral
- *Balanophyllia*
- branching dendro
- Blueberry gorgonian
- *Heteropsammia cochlea* (Walking Dendro)
- unknown cup coral (hitchhiker)

Understanding the Feeding Behaviors of Marine Fish

JASON ONEPPO

Reef fish in aquariums are generally grouped into three categories: reef safe, reef safe with caution, and not reef safe. These categories are based largely on feeding behavior but also on the fish's captive disposition. Knowing what fish feed on in their natural habitat can lead to greater success in captivity. Conversely, trying to keep the wrong mix of fish, invertebrates, and corals can be disastrous. This makes it important to research and understand each animal's natural feeding behavior before you make a purchase. Just because a fish is feeding on a prepared diet at your local fish store does not mean it won't eat live corals or other invertebrates in your aquarium, especially if these are natural foods for the species.

This article is meant as a guide to help you understand different feeding behaviors and why some species can be detrimental to your reef. Although this article will help inform your decisions when adding new fish to your reef, it is not a comprehensive list, so be sure to research each species you're considering.

What types of feeding behaviors do fish display on a wild reef? Fish are generally grouped into three feeding types: carnivores, herbivores, and omnivores. Here we will discuss these different groups and give brief descriptions and some examples of the types of fish that display these feeding behaviors.

Carnivores are meat-eating predatory fish. The diet of carnivorous fish can include other fish, crustaceans, mollusks, and invertebrates

Feeding Behaviors of Marine Fish

Feeding Category	What They Eat
Carnivore	Meat
Piscivore	Fish
Molluscivore	Mollusks
Vermivore	Worms
Planktivore	Plankton
Spongivore	Sponge
Corallivore	Coral
Herbivore	Plants
Algavore	Algae
Omnivore	Meat and Plants
Detrivore	Detritus
Coprophagy	Feces

Porcupine Puffers (*Diodon holocanthus*) are slow-swimming predators that often hunt at night, feeding on crustaceans such as snails. | Image by Soulfultography

Arch-Eye Hawks (*Paracirrhitus arcuatus*) will often sit on coral heads waiting for prey to get close. | Image by Carol Buchanan

that live in the marine environment. For the average person, the first fish that pops into his or her mind when discussing carnivorous marine predators is a shark. Most sharks are not suitable for home aquariums. Even smaller species that can successfully be maintained in suitably sized home aquariums are not suitable for reef tanks. Besides sharks, other commonly available marine carnivores include triggers, groupers, lionfish, and eels. Most of these are also not suitable for the average reef aquarium, but there are some exceptions to this rule. Many carnivorous fish that eat other fish and invertebrates can live peacefully amongst corals. Some carnivores that are recommended as reef safe with caution include dwarf angels, butterflies, tobies, and certain species of wrasses. With some of these fish, it's not necessarily the species, but the feeding preference of the individual that determines whether or not a specimen is reef safe. There are many reef-safe carnivores, including some wrasses, cardinals, chromis, dragonets, gobies, clownfish, and blennies. Further, there are a variety of subcategories describing the particular feeding habits of carnivorous fish. Let's take a look at those that are of particular interest to reef hobbyists.

Piscivores are carnivorous fish that prey on other fish. In general, most hobbyists don't keep piscivores in their reef aquariums. After all, most people want to keep more than one type of fish in their reef, and generally speaking, corals and invertebrates are the main focus. Many piscivores also feed on a variety of crustaceans. Species kept in reef aquariums are generally fish that are considered reef safe with caution. These include hawkfish, anglers (frog fish), dwarf (fuzzy) lionfish, eels, and some triggers.

Lionfish are carnivores that feed on small fish, shrimp, and other crustaceans. | Image by ilbusca

Molluscivores are carnivorous fish that have adapted to feed on mollusks. Mollusks are soft-bodied invertebrates; most have an external calcareous shell, and the group includes snails, nudibranch, clams, mussels, and octopuses. Mollusks, such as *Astraea* snails, Flame scallops, and *Tridacna* clams, are common in reef aquariums, another reason it is important to know which fish eat mollusks and specifically which types they feed on. The Six-Lined Wrasse, despite its semi-aggressive disposition, is reef safe and helps control parasites and other pests, including pyramid

snails that may parasitize *Tridacna* clams. Dwarf angels, considered to be reef safe with caution, like to feed on the mucus secretions of *Tridacna* clams. They also sometimes pick at the mantle, causing the clam to retreat into its shell and close. If the fish are persistent, the clam may remain closed most of the time due to the stress and die.

Vermivores are carnivorous fish that eat worms. Marine worms are any worms that live in the marine environment, including bristleworms, marine bloodworms, tubeworms, feather dusters, and flatworms. Large angels, butterflyfish, and wrasses are known to feed on marine worms. This should be taken into consideration when pondering the addition of one of these species to a reef aquarium. Some people have reported great success with Copperband Butterflies by feeding them feather dusters grown in the sump or refugium. Some wrasses, such as the Yellow Coris Wrasse, are known to eat fireworms and parasitic flatworms, but this can be hit or miss and depends more on the individual fish than the species.

Planktivores are carnivorous fish that feed on plankton. There are many commonly kept species of fish that fall into this category, such as Mandarins, anthias, and damsels. When discussing plankton in the marine environment or reef aquarium, it is grouped into two categories: zooplankton and phytoplankton. In the case of adult planktivorous fish, we are mainly referring to zooplankton, tiny animals that drift with the current. Many are microscopic, such as copepods, while others are much larger, such as krill. Also, many larval fish and invertebrates fall into the zooplankton category. Phytoplankton, commonly referred to in aggregate as green water or microalgae, contain chlorophyll, require light to grow, and consume nutrients such as nitrate and phosphate. Interestingly enough, zooplankton feed on phytoplankton, and some larger zooplankton will also feed on smaller zooplankton. Fish and even marine mammals eat zooplankton.

Planktivores such as this male Square Anthias (*Pseudanthias pleurotaenia*) feed continuously throughout the day and do best if offered several small feedings daily. | Image by Tony Schmidt

In the wild, planktivorous fish are like herbivorous fish in that they are continuous feeders. Does this mean there needs to be a constant supply of food for planktivorous fish? No! But being able to feed the aquarium two to three times per day, or installing an automatic feeding system, is beneficial. An understanding of the feeding behavior of planktivores has led to hobbyist success with groups such as the anthias. Success starts at the point of collection. Freshly collected anthias are placed into holding tanks and offered food immediately. It has been shown that offering food immediately upon introduction to a holding tank helps with the acclimation process. This allows fish to maintain high energy levels and not become stressed or starved to the point where they refuse to eat and perish. This is why you see more anthias thriving in aquariums today than in the 80s and 90s.

Spongivores are carnivorous fish that feed primarily on sponges. Large marine angelfish belonging to the genus *Pomacanthus* and *Holacanthus* are the best-known spongivores. Dwarf angels, parrotfish, and Moorish Idols will also feed on sponges.

The Copperband Butterfly (*Chelmon rostratus*) feeds on marine worms and other small invertebrates found on and around coral reefs. | Image by qldian

Some species of marine angels specialize in feeding on sponges, which comprise up to 95% of their diet in the wild. Many angel species are opportunistic sponge feeders. Angels target certain species of sponges as food. Some species of sponges contain toxins as predatory deterrents, and these are avoided. A spongivore's diet can also be determined by availability in the wild. For example, after a storm rolls through and displaces sponges on the reef, fish will seek out other food items such as polychaete worms and small invertebrates.

Corallivores are carnivorous fish that feed primarily on corals. Fish with this type of feeding behavior should be

Annularis Angelfish (*Pomacanthus annularis*) are primarily spongivorous but also consume algae and zooplankton. | Image by Tony Schmidt

avoided as additions to reef aquariums. It's important to know there are species of fish that are obligatory corallivores and others that are opportunistic coral eaters. Some species of butterfly and other fish, such as the Orange-Spotted Filefish, are classified as obligatory coral feeders. Some obligatory corallivores feed exclusively on specific corals. There has been some success getting corallivorous fish to accept readily available aquarium fare by housing them with corals that aren't on their menu. Dwarf angels will feed on the mucus secretions from coral but may also eat polyps or the meaty parts of corals. Even rabbitfish have been known to occasionally feed on coral (usually softies) in home aquariums, sometimes developing a taste for zoanthids. One key to preventing dwarf angels and rabbitfish from nipping at corals is keeping these fish well fed.

Herbivores are fish that have adapted to eating plant material. It is common for some freshwater fish to feed on the leaves of plants or trees overhanging the water, but marine fish are restricted to aquatic vegetation. Plant-eating marine fish are often referred to as herbivores or vegetarians. Most marine fish that eat vegetation are more accurately placed in the following category.

B&W Heniochus (*Heniochus acuminata*) feed primarily on zooplankton and crustaceans but will also nip at coral polyps and have been observed picking parasites from other fish. | Image by Tammy616

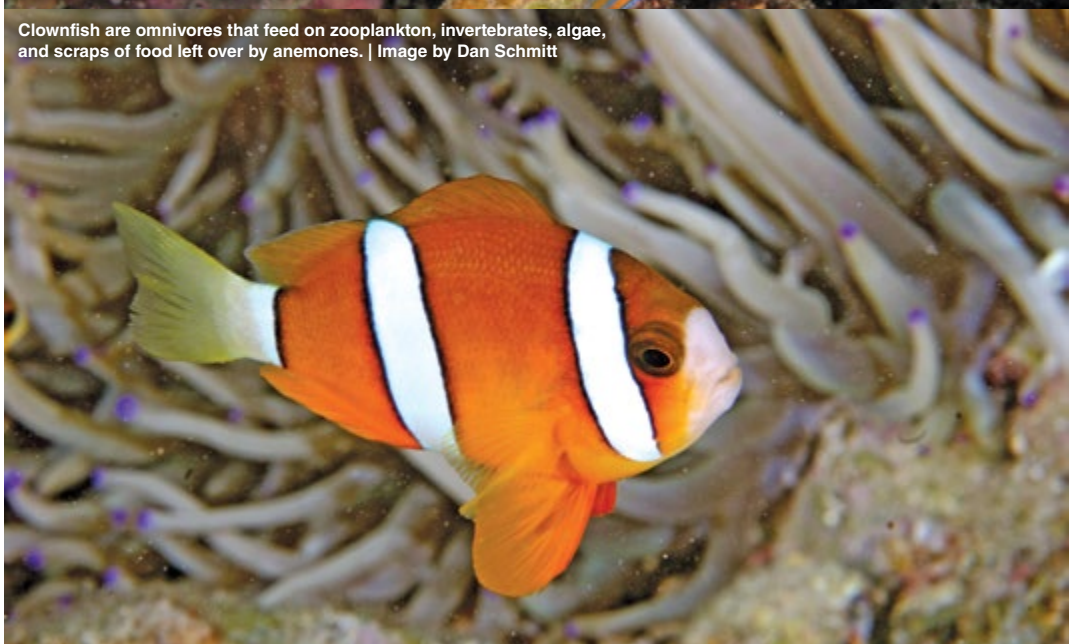
Algavores are herbivorous fish that eat algae, specifically macro algae. Tangs are the most popular algavores kept in reef aquariums. Some others include angelfish, blennies, and rabbitfish. There are many species of algavores varying in size, shape, and color, and they have a purpose in our tanks: to eat algae. On ocean reefs, large schools of tangs graze, keeping the reef from becoming overrun with algae. Fish that feed on benthic algae also ingest small invertebrates, zooplankton, and detritus. In average-sized reef aquariums, one or two tangs are usually sufficient to help control algae. You will often see videos on YouTube with tanks packed full of tangs. These tanks require frequent and large supplemental feedings. Keep in mind that tangs are continuous feeders and should be fed two to three times per day.

Yellow Tangs (*Zebrasoma flavescens*) feed on algae but also consume detritus, copepods, and fecal matter. | Image by Nancy Nehring

Omnivores are fish that eat both plant and animal matter. There are many dedicated carnivorous and herbivorous fish species. There are also a large number of omnivorous or opportunistic feeders. Angels, blennies, triggers, clownfish, damsels, chromis, and gobies are all examples of omnivorous fish that will feed on a variety of foods. Some individual species may have specific preferences, so it is always a good idea to do your homework before purchasing a new specimen for your reef.

Omnivorous fish, such as Emperor Angelfish (*Pomacanthus imperator*), feed on both plant and animal matter. | Image by Richard Ng

Detrivores can be carnivorous, herbivorous, or omnivorous fish that obtain nutrients by consuming detritus. Detritus is decomposing organic matter that floats around the marine environment and settles on the reef or ocean floor. Detritus is often referred to as marine snow. There are several species of fish that will consume detritus, including tangs, angels, damsels, and blennies. Many types of benthic-feeding fish ingest detritus while searching for and eating other organisms. Tangs often ingest detritus that has settled on algae. Some tangs' mouths have evolved in a way that helps comb



Clownfish are omnivores that feed on zooplankton, invertebrates, algae, and scraps of food left over by anemones. | Image by Dan Schmitt

detritus from algae so they can consume it; others will scoop it up directly from the sand.

Coprophagy is the behavior of eating fecal matter. Fecal matter is rich in nutrients and beneficial bacteria. Many reef fish exhibit coprophagy in nature, and most of us have witnessed this in our home aquariums. When new hobbyists view this odd behavior, they often ask if it is normal and if they should be concerned. This is a perfectly natural behavior and is how some fish, such as tangs, supplement a diet consisting mainly of macro algae and detritus. Fecal matter that settles on the reef and ocean floor adds to the detritus that fish feed upon.

Cleaner fish are fish that clean parasites and dead skin from hosts. Cleaner Wrasses and Neon Gobies are the best-known fish that provide these services, but this behavior can also be observed in other species. Some of these fish get the majority of their nutrition by consuming the parasites they pick off of host species, but they also occasionally supplement their diets by picking mucus and dead skin from their host.

I hope this article helped shed some light on the feeding behavior of different fish found on coral reefs; why fish are categorized as reef safe, reef safe with caution, and not reef safe; and the reasons you should thoroughly research fish before purchasing them to add to your reef—after quarantining them of course!

The Banggai Cardinalfish (*Pterapogon kauderni*) is an opportunistic feeder. The bulk of its diet is zooplankton, such as copepods. | Image by hikuta

Image by Legendary Corals

A Guide to Your First ANEMONE

MIGUEL TOLOSA

Even before *Finding Nemo*, if someone pictured a saltwater aquarium, that image would probably contain a clownfish living symbiotically in an anemone. Most computers come standard with at least one desktop background showing that same scene. For better or worse, it is likely that nothing has generated more interest and beckoned more newcomers into the hobby than these images, and many new hobbyists want to recreate these scenes in their very own home. Let's take a look at the most widely available of anemones: the Bubble-Tip anemone, formally known as *Entacmaea quadricolor*.

Bubble-Tip anemones are the most widespread of all clownfish-hosting anemones. The term "host" refers to the anemone, which provides a home for the clownfish and keeps away potential predators. The hosted clownfish repays the favor by bringing the anemone food. Recreating this natural symbiosis in our own homes is a rewarding experience that anyone can enjoy with the right preparation.

One of the largest hurdles to overcome, often discovered too late by the new hobbyist, is that Bubble-Tip anemones are fairly difficult to keep. There are some fish stores that will take advantage of new hobbyists and understate this fact in order to sell Bubble-Tip anemones to people whose tanks are not yet ready to keep them. I have seen fish store employees selling anemone and clownfish combos to people whose tanks are barely a week old, which is practically a guaranteed death sentence for these beautiful creatures. Another common issue is tank size; while it is possible to keep Bubble-Tip anemones in small displays, it also takes a large amount of experience to keep a small system stable enough for an anemone, so 20 gallons is the minimum size I'd recommend.

STABLE PARAMETERS

It takes approximately 3 to 4 months before a new tank is stable enough to safely house an anemone. While one can be added sooner by more experienced hobbyists, this time frame also allows

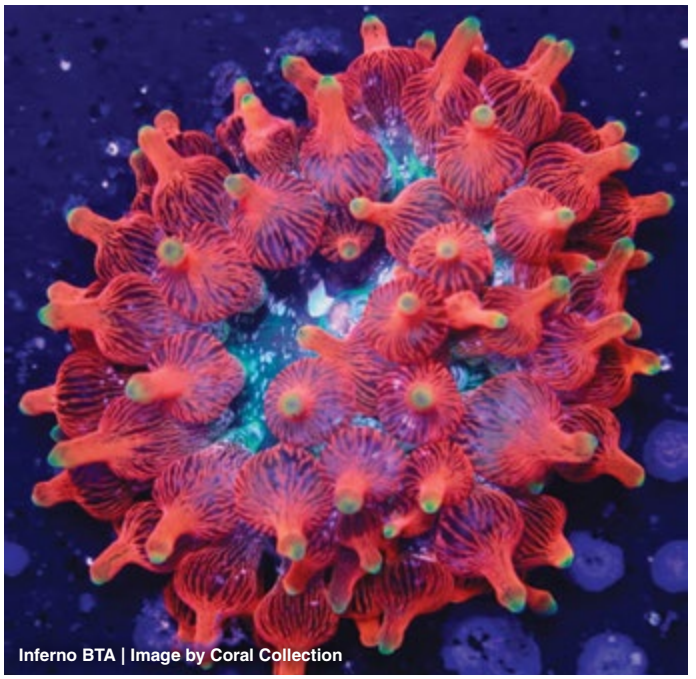
Flame Tip BTA | Image by Coral Collection

Supernova BTA | Image by Coral Collection

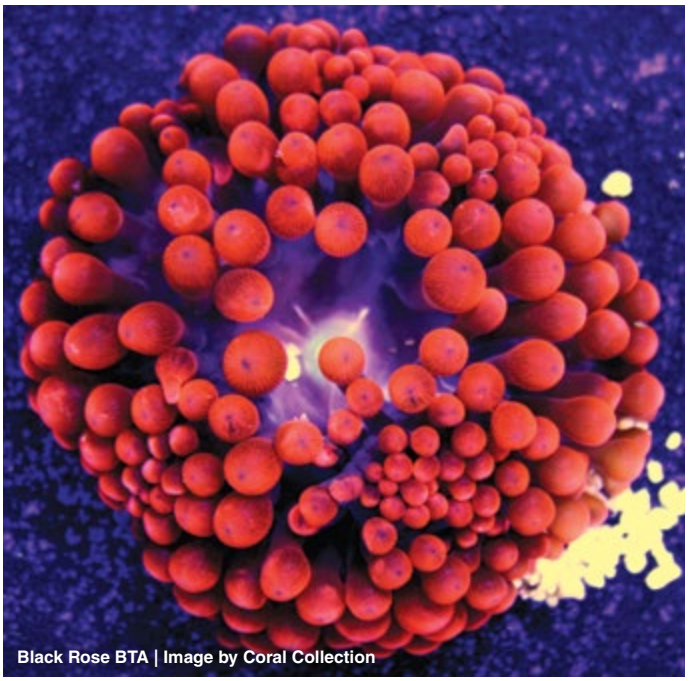
a new hobbyist some time to learn how to keep a tank stable. There are two vital considerations to address before bringing home a Bubble-Tip anemone: stability and lighting. Stability is paramount to keeping a healthy and thriving Bubble-Tip anemone. What this means is that the tank has to be well past its cycle stage and bacteria need to have colonized the rocks and filter material to the point where there are no longer any ammonia spikes or algae blooms. A new tank with algae problems is still going through its "new-tank uglies" phase, is still processing nutrients remaining from cycling, and will make a poor environment for a new anemone.

Green Grape BTA | Image by Coral Collection

Stability also means maintaining consistent water chemistry, and this is where new hobbyists face the steepest learning curve. Salinity is a key factor in keeping Bubble-Tip anemones healthy; it needs to be accurately measured and kept at a consistent level. The best way to accurately measure salinity is with a refractometer



Inferno BTA | Image by Coral Collection



Black Rose BTA | Image by Coral Collection

that is regularly calibrated with calibration fluid. While there are other measuring options, some of them, such as swing-arm hydrometers, are notoriously inaccurate. If there is one piece of equipment in the hobby not to skimp on, it would be a refractometer with calibration fluid!

Just as important as measuring salinity is keeping it stable, and this is where an auto top-off system comes into play. Salinity rises as water evaporates, and an auto top-off will keep salinity levels consistent. A reef tank without an auto top-off is always in a state of imbalance, even if just to a small degree. This affects not only anemones but every other tank inhabitant as well. An anemone should not be added to a tank without an auto top-off, but it's such an important tool that no reef tank should be without one even if it doesn't house an anemone.

Other key water parameters are alkalinity, followed by calcium and magnesium. Even though anemones do not have a skeleton

Supernova BTA | Image by Coral Collection

AQUASUN LED HO

WHY MODULES?

A COST EFFECTIVE SOLUTION
that allows you to easily replace LED's and not the entire fixture.

A FULLY CUSTOMIZABLE SOLUTION
that allows you to swap out LED modules for different lighting effects and tank environments.

THREE VARIETIES *of* MODULES AVAILABLE:

LIGHT MODULE (ITEM AL-SM)
The standard module included with the AQUASUN LED HO Aquarium Fixtures. Provides bright white light for viewing & shimmer effect, and blue light for coral growth & moonlight effect. Includes four white 6000K LEDs (one watt each), and two blue 465nm LEDs (500 milliwatts each).

DAYLIGHT MODULE (ITEM AL-DM):
For increased white light in your aquarium. Includes four white 6000K LEDs (one watt each), and two white 6000K LEDs (500 milliwatts each).

PLANT MODULE (ITEM AL-PM):
Provides the correct wavelengths needed for promoting chlorophyll absorption and photosynthesis. Includes four white 6000K LEDs (one watt each), and two red LEDs (620 to 630nm, 500 milliwatts each).

FOR FRESH *and* MARINE WATER AQUARIUMS

AQUASUN LED HO AQUARIUM FIXTURES AVAILABLE in 18", 24" 36" and 48" SIZES.

WWW.ZOOMED.COM

like hard corals, they still rely on stable pH and alkalinity in order to thrive, and alkalinity swings can be very stressful for them. A tablespoon of pickling lime per 5 gallons of freshwater in the auto top-off container is probably the easiest way to keep alkalinity stable; otherwise, it is necessary to regularly test the alkalinity and manually add a buffer. Alkalinity needs to be balanced along with calcium and magnesium, and the proper ratio of these three are an alkalinity of 7–11 dKH, calcium of 350–380 ppm, and magnesium of 1280–1400 ppm. Part of the 3- to 4-month necessary learning curve for the new hobbyist involves getting used to testing and keeping these parameters stable before adding an anemone.

LIGHTING

Regarding lighting, Bubble-Tip anemones are tropical and tend to be found in shallower water, so the most appropriate lighting would be T5, LED, or metal halide. Power compact or other low-output fluorescent lighting that is common with all-in-one cube tanks is not strong enough to keep a Bubble-Tip anemone healthy and happy. An anemone will simply not live well in one of these tanks, and it should not be attempted. Too intense a white spectrum can burn or stress Bubble-Tip anemones, as can being introduced to artificial lighting in general, so using LEDs that have an adjustable white channel is preferable to fixed-output lights. Not all LED fixtures are created equal; it is important to research whether a fixture is sufficient for anemones and hard corals. Some LEDs are even lower output than power compacts.

Now that the tank is stable and has adequate lighting, it is time to pick out a Bubble-Tip anemone. The best place to start would be a local reef club where someone may be giving them away. Another good source would be a local fish store,


Image by Cherry Corals


Image by Cherry Corals


Image by Cherry Corals

which can often be much cheaper than online vendors for essentially the same anemones. Anemones are quite prone to bacterial infections, so it is important to make sure the anemone looks healthy before adding it to your tank.

CHOOSING A HEALTHY ANEMONE

The first and most important quality to look for in a healthy anemone is that it is fully inflated. An anemone that looks deflated, wilted, or drooping is not an ideal candidate and can have any of a host of issues. It is not uncommon to walk into a fish store only to find that every anemone fails this first test, since a deflated anemone can be the result of many different factors. These factors include being stressed from recent shipping, poor water quality, or infections. The anemone should also have fairly solid color without any translucent or faded areas. A bleached anemone has been stressed, is compromised, and is not a great candidate to take home.

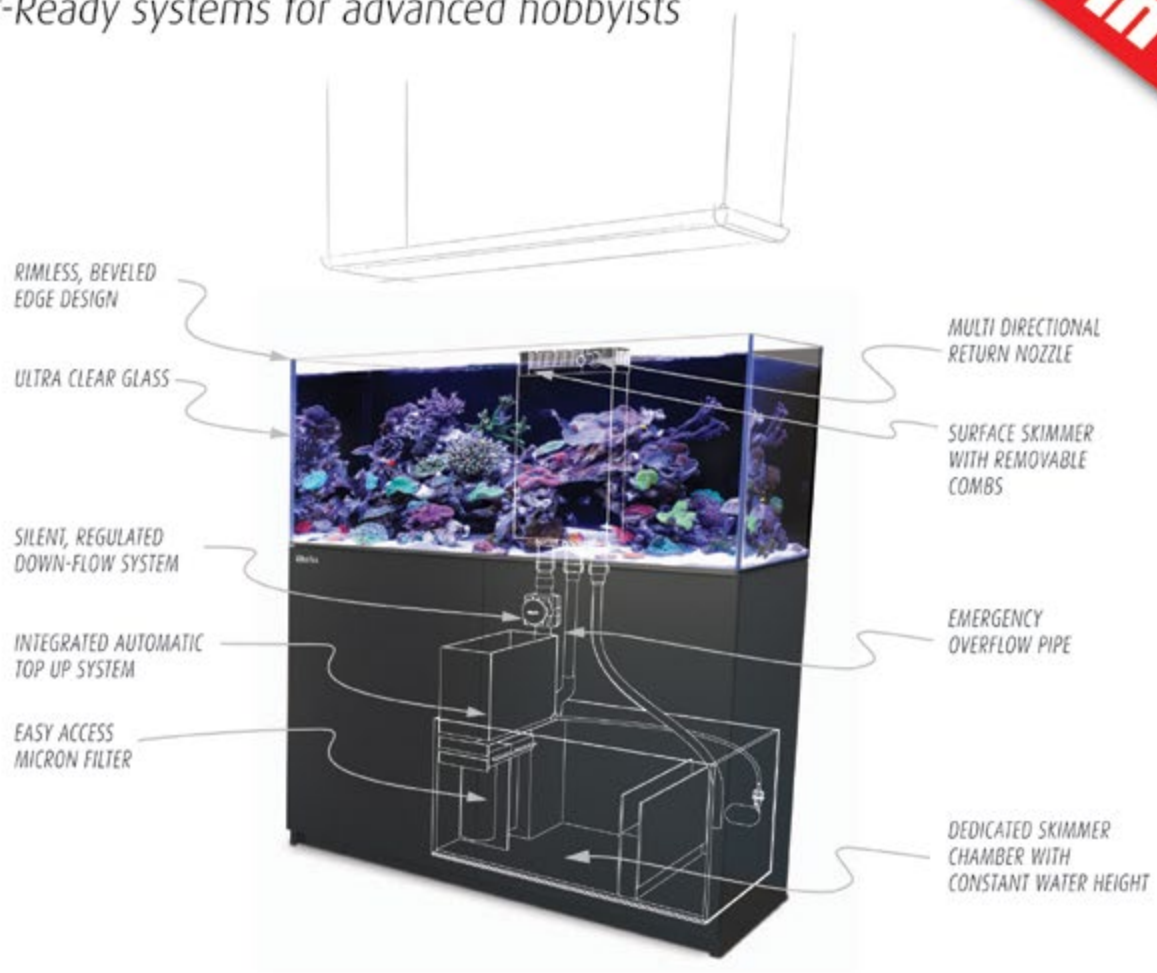
An equally important quality is that the anemone has a small and tightly closed mouth. A large, gaping, or deformed mouth is a red flag that something is amiss, and while it is important to note that newly shipped anemones can have gaping mouths for a short period of time after arrival, there is simply no way to know what the cause is until it stops. In any event, even a healthy anemone with a temporarily gaping mouth is stressed and should not be transferred to another tank; don't settle for less than an anemone in apparent good health.

So now we have a nice inflated anemone with a healthy mouth. There is one more issue that is sometimes difficult if not impossible to discover until it is too late. This would be the dreaded tear on the foot of an anemone. In my opinion, this is the most common cause of death in any newly imported animal. These are common injuries resulting from either overzealous collectors

Red Sea REEFER™ SERIES

Now in XL

Reef-Ready systems for advanced hobbyists



The REEFER™ Series combines a contemporary, rimless, ultra-clear glass aquarium with a stylish cabinet and a comprehensive water management system, including a professional sump, integrated automatic top-up, and Red Sea's unique silent down-flow system.

Personalize your aquarium experience by seamlessly integrating your preferred choice of equipment into the REEFER™ advanced sump and water management system, and enjoy your own thriving coral reef.

REEFER™ NANO | **REEFER™** 170 | **REEFER™** 250 | **REEFER™** 350 | **REEFER™** 450 | **REEFER™ XL** 425 | **REEFER™ XL** 525

Red Sea

For more information please visit our website: **www.redseafish.com**

Inferno BTA | Image by Coral Collection

removing anemones too hastily from rocks in the wild (which is much less common these days) or inept wholesale employees who carelessly tear them out of holding tanks. This is especially common when the anemones are attached to tank corners as they often are. A torn foot is usually the root cause of a deflated anemone, and depending on the size of the tear, it can take some time for an anemone with a torn foot to go from looking healthy to deflated and drooping.

An anemone with a torn foot can look completely normal for a period of time, but there are a few things to watch for that can indicate a healthy foot. First and most important is to make sure the anemone is attached to something instead of loosely floating along the bottom of the tank with a foot that looks over-inflated. While this is the normal appearance of a newly arrived anemone, it should not continue to look like this for any appreciable period of time since it is in a healthy anemone's interest to quickly attach to a surface in order to live and feed safely. However, an anemone with a tiny foot tear can attach to a surface, especially if the foot was recently torn at the wholesaler prior to shipping. So it doesn't hurt to take a good look at the foot itself to see if any damage is apparent.

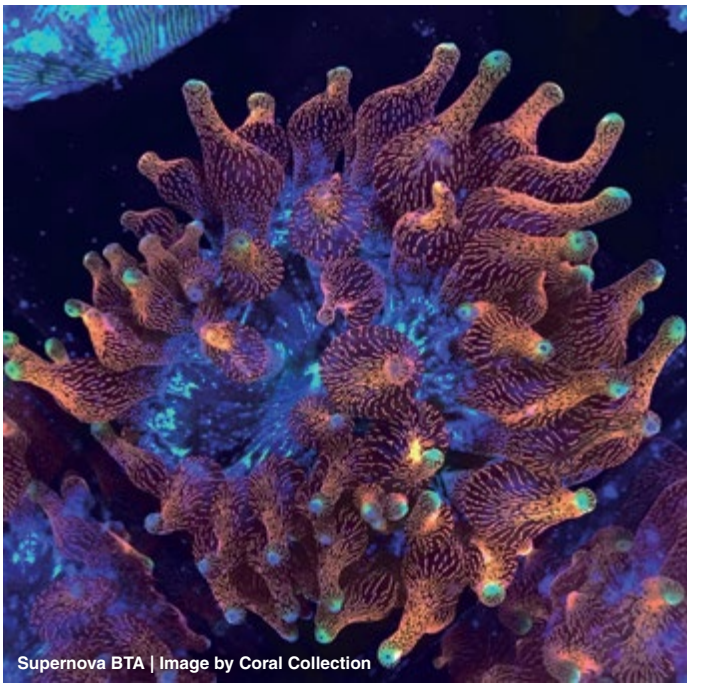
ACCLIMATION

At this point, we have a stable tank with good lighting, and we've

brought home a healthy anemone with an intact foot. Now it's time to acclimate. Begin by floating the anemone in its bag for 10 to 15 minutes in your tank in order to not shock the anemone with a sudden temperature change. There are two schools of thought on where to go from here: lengthy drip acclimation or fast acclimation. Fast acclimation, in my opinion, is better for anemones that have been shipped or anemones that come from water that has the same alkalinity as your tank. In this scenario, the anemone is removed from the bag, allowed to sit out on a flat surface for 2 to 3 minutes so that it spits out most of its water, and then placed in the tank. Many people, including myself, do this for all anemones, and I have had no losses. However, drip acclimation prevents alkalinity and pH swings that can be stressful to new anemones, so some will place the anemone and its water in a bucket and drip acclimate for 30 to 45 minutes using 1/4" tubing, siphoning at approximately 3 to 4 drops per second. This can be easily accomplished by tying one or several knots in the tube and slowly tightening them until the water slows down to the desired flow rate.

LIGHT ACCLIMATION

Light acclimation is equally important in order to avoid shocking the new arrival. Acclimate the anemone with a screen over the tank or turn down the lighting if possible. Reducing the photoperiod (fewer hours of light per day) during this time may help as well. Avoid placing the anemone in the top half of the tank. Instead, place it somewhere near the bottom, and accept early on that it will probably not end up where you initially placed it. The most likely thing your anemone will do is wedge itself into a crevice and stay



Supernova BTA | Image by Coral Collection

there for a week or two. For this reason, it's a good idea to put it near a crevice at the front of your tank so it doesn't decide to check out the back of the tank for a good place to live. The crevice should provide some shade as the anemone slowly gets used to its new surroundings.

INITIAL FEEDING

Finally, avoid feeding the anemone until it is completely settled in, attached, and fully inflated. Digestion takes energy that an anemone might not have in a newly arrived, weakened state, and some (especially smaller ones) die from trying to process a meal too soon after a move. Resisting the temptation to feed prematurely will help speed along the process of the anemone adapting to its new home.

TAKING A WALK

To be fair, keeping an anemone is not an easy task and is fraught with difficulties. If the previous steps were followed, then the tank now has a healthy anemone inhabitant attached somewhere, but there is no guarantee that the anemone is happy where it started. Bubble-Tip anemones pack quite a sting and are notorious for taking leisurely strolls across entire tanks, leaving a path of destruction in their wake. Even anemones that have been stable and happy for years will randomly decide that it's a nice day to go walk through a row of corals, generally bee-lining toward the most expensive or favorite coral in the tank and planting themselves right on that rock as dictated by Murphy's Law.

A large concern with a walking anemone is that it will walk right into that most dangerous of aquarium products: the "blender of doom," more commonly known as a powerhead. Powerhead intakes need to be covered with foam or some kind of barrier in order to prevent the anemone from getting sucked in. This is especially problematic with Bubble-Tip anemones since they usually like to stretch out in higher flow areas. As the anemone moves closer to the powerhead, the water movement becomes stronger. The anemone stretches until it is inevitably sucked into the powerhead and exits as confetti. This creates two very immediate problems. The first of which is that all of the shredded pieces of Bubble-Tip anemone can still sting corals just as if they were still attached to the anemone. The second of which is that these pieces, and what remains of the foot of the anemone that is likely still lodged in the powerhead, are breaking down and quickly turning into ammonia in your tank. This brings us to an item that no anemone owner should be without, and that is activated carbon.

As most hobbyists know, activated carbon is arguably the most useful aquarium product to have in an emergency. Having a reef tank without carbon on hand is asking for trouble, but having an anemone tank without carbon on hand is courting disaster. Carbon will remove impurities and toxins from water fairly quickly, which is incredibly useful in an anemone tank since the worst-case scenario is that a sick anemone will crawl between rocks and die. This has been the cause of many tank crashes (the sudden ammonia spike), and having activated carbon available to clean up the water in this case will likely save all of your tank's inhabitants.

PAIRING

One thing that comes as a surprise to many hobbyists is the fact that a clownfish can sometimes have zero interest in an anemone. Clownfish that are captive bred for many generations tend to be more difficult to get interested in hosting in an anemone. To be honest, I can't even get my two ultra-grade Picasso clownfish to leave the top corner of the tank for more than 10 minutes a day, so it's likely that we have inbred some fish a little too much to keep their natural instincts intact as a tradeoff for more unique patterns. Still, there are ways to get clownfish into anemone hosts with varying degrees of success, but it usually takes some patience.

One of the more successful methods is to tape a picture of a clownfish facing inward on the outside of the tank. This can make the fish in the tank feel more territorial and likely to seek shelter in an anemone to defend their territory. While it may not work immediately, it has been one of the more common methods used to encourage pairing. A completely opposite and somehow still relatively successful method has been to place a small plastic clownfish (these

Lemon Drop BTA | Image by Coral Collection

THE ULTIMATE ALL-IN-ONE FILTER MEDIA

CRYSTAL CLEAR water

for over 50 years

Chemi-pure Blue Nano
is the ultimate all-in-one marine aquarium filtration media available today! They are in easy to use, conveniently sized 5 gallon nylon packets that offer superior filtration and fantastic results in even the most advanced marine, reef and/or jellyfish aquariums. **Chemi-pure Blue** combines the highest grade of low dust extruded pelletized activated carbon with premium ion exchange resins to produce a synergistic formula for the health and wellbeing of your aquarium inhabitants. Chemi-pure Blue is capable of handling the toughest, dirtiest aquariums, yet gentle enough to be used in air driven, desktop jellyfish aquariums as well.

Boyd Enterprises
Advanced Aquarist Products
www.chemi-pure.com
YouTube

Image by Coral Collection

are usually sold as veggie clips for tanks) next to the anemone. This is especially effective with smaller clownfish that tend to live in groups, and the fish will sometimes follow your lead right into the anemone. Of course, regardless of how hard you try, the clownfish may never decide to live in an anemone, or other times they may decide to live in anything but an anemone. I have had clownfish inexplicably decide to live in mushrooms directly adjacent to an anemone. At the end of the day, they're still fish and will do whatever they please regardless (or seemingly in spite of) how much we wish they wouldn't.

PROPAGATION

The most popular way to propagate Bubble-Tip anemones is to cut them in half. This requires a fresh razor blade, a clean surface or cutting board, and a safe place in which to reintroduce the anemone halves back to the tank. It is important to keep in mind that unlike Maxi-Mini anemones, which are essentially bulletproof, it is not uncommon to have complications from manually propagating Bubble-Tip anemones.

The first step in propagating a Bubble-Tip anemone is to start with a healthy candidate. The anemone should show no signs of being deflated or unhappy and will need to be unattached from any rocks or surfaces. Ideally, the anemone should be well fed for 4 days leading up to propagation. Josh at Gonzo's Corals has refined this method down to a science using aquatic plant baskets from Home Depot. The baskets provide a container from which anemones are easy to remove and that also allows good water movement, which we will go over soon.

A bare minimum size for an anemone candidate is around softball sized when fully inflated. The reasoning is that once the anemone is cut in half, it will take some time to heal before growing. Anemones grow at rates relative to their size, so cutting an anemone smaller than a baseball will result in two halves that take exponentially longer to reach their original baseball size than two halves of a softball-sized anemone would. I know several hobbyists who were impatient in letting their anemones grow out and propagated them at a very small

Image by Coral Collection

size. Last I checked, their anemones were still the same tiny size over 6 months later, so keep in mind that patience before fragging is well rewarded in propagating anemones.

The process of propagating a Bubble-Tip anemone is fairly simple, although I would very much recommend looking at a few YouTube videos

Rainbow BTA | Image by Legendary Corals

Flame BTA | Image by Coral Collection

Inferno and Lemon Drop BTA | Image by Coral Collection

beforehand to see how everything is done. First, the anemone is removed from the tank and placed onto a cutting board that has been splashed with saltwater. Allow the anemone to sit for a minute or two in order to expel some water, and then make a clean cut directly down the center of the anemone and through the mouth. This is easier said than done since the anemone will shrivel up and make the mouth difficult if not impossible to find; some guesswork is usually needed. Another reason that a larger anemone makes a better candidate is that it is likely to better hold its shape during cutting, which makes estimating the location of the mouth easier.

As we touched on briefly before, once the anemone has been cut in half, it should be placed into a container that has consistent water movement. Water movement is crucial for any coral or invertebrate that is manually propagated, and this is especially true for Bubble-Tip anemones. Without good water movement after fragging, the anemone can succumb to an infection fairly quickly from which it is usually extremely difficult, if not impossible, to recover. This is why the aquatic plant containers mentioned above or something similar are crucial for propagating anemones.

Aside from manual propagation, Bubble-Tip anemones have also been known to reproduce sexually in captivity. While there are no reports of these spawns turning into baby anemones and settling throughout the tank, it is still quite a sight and generally a sign that the tank is stable and well kept. The downside is that when anemones spawn, they will release an almost unimaginable amount of white clouds into the tank. Some tanks, especially smaller ones, get so cloudy that it's hard to see much of anything. This can quickly become an issue if these gametes are not removed before they break down. A combination of heavy skimming and carbon will reduce the possibility of dangerous ammonia or nutrient spikes resulting from the sudden decay of this organic matter in the tank.

While keeping a Bubble-Tip anemone isn't for everyone, it can be an immensely rewarding experience to create one of nature's most iconic pairings in our own homes. For some, a large part of this hobby is to bring as much of the ocean's wonder into our lives as we can, and Bubble-Tip anemones can fill a unique role in making things feel complete in your tank. Hopefully, you're one step closer to knowing if an anemone is right for you, or maybe the seed has been planted for a future tank addition.

"We Raised Pygmy Seahorses in Captivity for the First Time Thanks to Reef Nutrition's Feeds."

"Reef Nutrition's feeds enabled the Steinhart Aquarium to raise pygmy seahorses in captivity for the first time–by keeping their host sea fans thriving. Reef Nutrition's whole-organism and microalgae blends, **Phyto-Feast®**, **Roti-Feast®**, **Oyster-Feast®** and **Shellfish Diet®** helped the team to feed the sensitive gorgonian corals that serve as home for these amazing seahorses."

CALIFORNIA ACADEMY OF SCIENCES

— **Rich Ross**, *Senior Biologist, Steinhart Aquarium, California Academy of Sciences; Marine Societies of North America (MASNA) 2014 Aquarist of the Year*

The unique benefits of Reef Nutrition feeds:

- More colorful reefs and cleaner tanks
- Super nutrition from intact cells & organisms
- Concentrated – more for your money
- Cutting-edge, science-based feeds

Buy from retailers that carry refrigerated Reef Nutrition products or go to www.reefnutrition.com and click the "How to Buy" tab.

Visit us: ReefNutrition

Reef Nutrition®
WE FEED YOUR REEF

THE REED MARICULTURE INC FAMILY OF BRANDS

APBREED
Aquarists • Propagators • Breeders

Reed Mariculture
ENSURING HATCHERY SUCCESS™

CELEBRATING 15 YEARS

EST. 2001

ESHOPPS

SIMPLICITY DEFINED

SIMPLICITY DEFINED

CELEBRATING

YEARS

16285 Gale Ave. City of Industry, CA 91745
Tel: 626-968-3678 | Fax: 626-236-9387
www.eshopps.com | sales@eshopps.com