AQUATICA

THE JOURNAL OF THE BROOKLYN AQUARIUM SOCIETY
VOL. XXIII NOVEMBER ~ DECEMBER 2008 No. 2

Join us for our free fabulous
ALL YOU CAN EAT
HOLIDAY DINNER PARTY
December 12th @ 7:30pm
All members, their families and
friends are welcome.
(Details on page 44)

Emperor Tetra
Nematobrycon palmeri

Illustration: John Todaro

AQUATICA

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The **Brooklyn Aquarium Society Inc.** is a non-profit organization 501(c) (3) for people interested in the aquarium hobby and the study of aquatic life. The Society meets the 2nd Friday of each month except July and August at the Education Hall of the New York Aquarium at Coney Island, Surf Avenue at West 8th St., at 7:30 PM.

Meetings are open to visitors. Refreshments are served. Membership is $25 per year family/$20 individual/$15 for students under 14. Send inquiries or membership checks payable to:
Brooklyn Aquarium Society c/o Membership Chairperson, P.O. Box 290610, Brooklyn, NY 11229-0011.

On occasion, the Brooklyn Aquarium Society uses its mailing list to send notices of interest other than society business to our members. If you do not wish to have your name used in this manner call, **the Hotline** 718 837-4455 and leave a message.

BROOKLYN AQUARIUM SOCIETY
CALENDAR OF EVENTS
2008-2009

DEC 12 ~ **BAS Holiday Party** ~ Members, their families & friends • All you can eat dinner • Fish bingo & prizes • BAS Awards presentation.

Happy New Year
2009

Jan 9 ~ **Joe Yaiullo** ~ **Breeding Marine Fish In Atlantis Marine World's 20,000 Gal. Tank.** Marine fish & aquacultured corals, freshwater fish & dry goods auction • Discount books & sales.

FEB 13 ~ **Terry Siegal** ~ **Marine Reef** ~ Marine fish & aquacultured corals, freshwater fish & dry goods auction • Discount books & sales.

MAR 13 ~ **Bob Larsen** ~ **The Glorious Guppy** ~ Freshwater & marine fish, aquacultured corals, plants auction • Discount books & sales.

APR 10 ~ **Tony Vargas** ~ **Diving On The Philippine Reefs** ~ Marine fish & aqua-cultured corals, freshwater fish & dry goods auction • Discount books & sales.

MAY 8 Spring Auction ~ Freshwater fish, plants, marine fish, aqua-cultured corals & dry goods auction; including a 55 gal tank & stand • Raffles • Discount aquarium books & sales• Door prizes.

JUN 12 Meet The Experts Experts will answer your questions at a Freshwater fish table, Plant table, Marine table and a Live/Frozen foods table. Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction • Discount books & sales • Door prizes • Raffles • BAS Elections.

Summer Break July & August

SEPT 11 ~ **TBA** • Freshwater & marine fish, aquacultured corals, plants auction • Discount books & sales.

OCT 9 ~ **Fall Giant Auction** • Freshwater fish, plants, marine fish, aquacultured corals & dry goods auction • Discount books & sales • Raffles • Door prizes.

NOV 13 ~ **TBA** • Freshwater & marine fish, aquacultured corals & plants auction • Discount books & sales

DEC 11 ~ **BAS Holiday Party** ~ Members, their families & friends • All you can eat dinner • Fish bingo & prizes • BAS Awards presentation.

All Events held the 2nd Friday of the Month at 7:30pm at the Education Hall of the
New York Aquarium ~ Surf Avenue & West 8th Street ~ Brooklyn, NY (unless stated)
We request a $5 Donation for non-members, good towards membership the night of the event only.

FREE REFRESHMENTS AND FREE PARKING AT EVERY MEETING- UNLESS STATED

NOTICE TO ALL MEMBERS

A motion was made, seconded and passed at the March board meeting (3/7/08) that membership cards be made up and handed out the night a person joins the BAS. If you join or renew by mail you must come to the next general meeting to get your card. Publications will still be sent by mail.

Web memberships do not get a card, and only get publications that may be on-line. The cost of mailing has gone up and this is a cost-saving measure.

A VOICE FROM 1919 SPEAKS AGAIN

As you must all know by now, the Brooklyn Aquarium Society will be 100 years young in 2011. We're planning a birthday party to celebrate this momentous and exciting event. Our president, **Joe Graffagnino,** has been looking into how and where we will hold the party. Of course, all our members and friends in the hobby are invited to attend.

Relevant to our Educating Aquarists for a century, I have been working on a history of the BAS. I thought it would be rather easy...but nooo, the history has taken on a life of its own and I've discovered many interesting facts both about the Society and some its members that served on our Boards throughout two world wars, depressions, and changes in our society.

I've been fortunate enough to have at my disposal almost all of the back issue of the Society's publications from the 1960's, 70's and 80's that were donated to us by a former member, **Marcia Repanes.**

I also have **Frank Policastro** to thank for his gracious donation to the Society of his vast collection of BAS historical memorabilia. Frank also spent many hours with me reminiscing, on tape, about the Society and his time as a Board member and Treasurer. He helped me fill in many blanks in the running of the Society in the 1960's and stories about some of the odd-ball Presidents of the BAS.

Frank holds the distinction of being the longest continuous member of the Brooklyn Aquarium Society. He's also a member of the North Jersey Aquarium Society and its Treasurer, plus being the Treasurer of the Northeast Council of Aquarium Societies (NEC) and the husband of **Christine Policastro ,**the present President of North Jersey AS.

Frank's memorabilia include copies of many of the very first *The Aquarium Bulletins* from 1916 to 1919. They were excellently produced and real treat to read.

I thought it would be interesting to give voice to the men that ran the society in 1916. I know they would be gratified to see their Society still going strong after almost 100 years.

On the following page I have reprinted an article from **George W. Post,** BAS President in 1919. Here's a short piece he wrote in the June 1919 issue of *The Aquarium Bulletin*..

THE BENEFITS TO BE DERIVED THROUGH MEMBERSHIP IN AN AQUARIUM SOCIETY

By Geo. W. Post

I have been a member of th e B rooklyn Aquarium Society, Inc. ever since its first feeble efforts to make itself known as a Society, in fact I was one of its charter members. After various ups and downs, we incorporated and felt that we were on the right road to build up and maintain an active and successful Society with an enthusiastic working membership and, when I compare conditions as they exist at present with the ones of a few years ago, I am convinced that we made no mistake in incorporating and expanding and placing theSociety on a scientific basis.

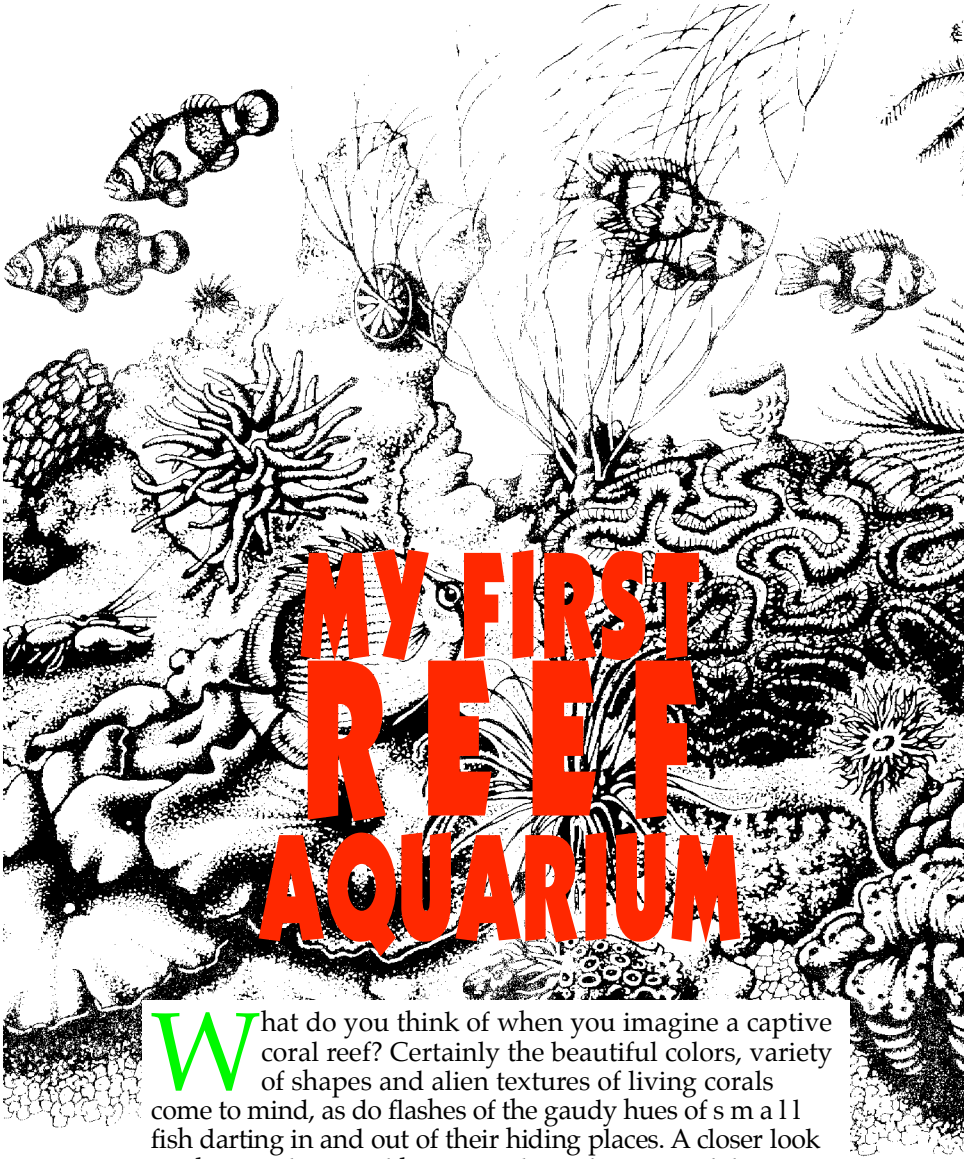
Occasionally, I hear someone ask what benefits are derived through being a member of The Brooklyn Aquarium Society. Now this sort of question irritates me and I am sorry that the one asking it does not consider the question a little more carefully before putting it. My usual response to such an inquiry is to the effect that the benefits are many and well worth the small amount we pay each year for them. Let me state a few of the important ones and see if I am not right.

Our Society is now recognized as a scientific body devoted to the study of ichthyology and botany as the latter applies to aquatic and semi-aquatic plant life. We have been able to hold annual exhibitions in the Brooklyn Museum and the kind of treatment we have received there, together with the assistance given us in making the exhibitions a success, have been greatly appreciated and have served as an incentive for our own efforts in making the exhibition worthy of the Society and of the building in which they were held. Other departments of the City, too, have contributed toward making them the success that they were.

Among the members of The Brooklyn Aquarium Society are many of the recognized leading fish fanciers of the country, men who have devoted years of time and study to the propagation and breeding of plants and animal life that may be kept in home aquaria. These men have developed the goldfish to the most advanced stage and placed the most beautiful specimens within reach of all. Others are continually at work crossing and re-crossing tropical fish and in this way developing new species. To the amateur, the help and advice of these leaders of the fancy are worth many times the dues they pay to obtain them and to the more advanced fancier the association with men who are doing things is a most pleasant one. Summed up then, the direct benefits to be derived are the help, advice and association of leading men in the hobby that interests you most and from these, from the last mentioned particularly, many indirect benefits will result as a matter of course.

Now with a statement of just a few of the very many advantages that are offered to members of our Society, I hope the ones who have not fully given the matter of membership a careful scrutiny will do so and I am confident that it will be a long time before I hear “What does it amount to, being a member of The Brooklyn Aquarium Society, and what do I get out of it?”

Andrew Blumhagen F
rom Delta Tale, Vols. 31 &32, Potomac Valley Aquarium Society



MY FIRST REEF AQUARIUM

What do you think of when you imagine a captive coral reef? Certainly the beautiful colors, variety of shapes and alien textures of living corals come to mind, as do flashes of the gaudy hues of s m a l l fish darting in and out of their hiding places. A closer look might reveal comical hermit crabs picking tiny delicacies from the rock and snails grazing on an invisible layer of algae. Perhaps a feather duster worm suddenly retracts its delicate tentacles as it senses your shadow, or a shrimp dances in the current as its antennae sweep the environs looking for its next meal.

But as soon as you are entrenched in this underwater reverie, you realize that the equipment alone for this wonderful creation costs more than half a year's rent and that the invertebrates are more sensitive than wild-caught discus - ready to crash spectacularly the moment your visiting mother-in-law sneezes in the wrong direction. The plumbing looks like the inner workings of a steam engine, the fish never seem to last for more than two weeks and the water chemistry would baffle a Nobel laureate. Who needs the trouble when you can go to a public aquarium and see the same magic without the hassle? Heck, even a SCUBA tour of the Solomon Islands would be cheaper! Well, believe it or not, you're now going to learn how to re-create this delicate but beautiful environment for about two hundred dollars and one hour of maintenance each month.

Equipment:

The micro-reef aquarium described here is centered around the Eclipse System Six. The Eclipse incorporates the tank, hood, filter and light into a compact unit that sits on any flat surface capable of supporting 75 pounds. It measures 16" long by 8" deep by 14.5" tall and holds (you guessed it!) six gallons of water. The front curves outward to create a magnifying effect and the sides taper slightly towards the rear. The tank's construction of high-quality acrylic also enhances the appearance of the system. The hood contains an 8-watt fluorescent light completely covered by a plastic shield, a small pump that feeds the filter, a floss and carbon cartridge, and a Biowheel. The hood is completely sealed so that the reef critters stay in the tank and everything else stays out. The Eclipse System Six retails for approximately $60.

As small and simple as the Eclipse System Six is, it performs all of the functions necessary to sustain a simple coral reef aquarium. The fluorescent bulb is bright enough for hardy corals and other sessile invertebrates that will be described later. The bulb included with the Eclipse is a broad-spectrum daylight bulb that is perfect for the reef, however, a bulb with a stronger blue spectrum, such as a Power-Glo bulb, which will set off the inflorescence of certain corals, may be substituted. The purpose of the floss and carbon cartridge is fairly obvious, though it's important to maintain fresh carbon in a small system such as this to absorb accumulations of dissolved organic material. The Biowheel provides efficient wet/dry filtration for the system and keeps the water well aerated. Due to the inherently high amounts of dissolved solids in saltwater, it holds much less dissolved oxygen than freshwater does, therefore, the Biowheel becomes an essential component of the system.

If the system is placed in a room where the ambient temperature drops below 70°, a small, submersible heater will be needed. A 25 watt VisiTherm heater, which retails for about $15, is ideal. The optimum temperature is 75°, but keep in mind that the light and pump will add about four degrees to the system. A timer for the light is essential, as a consistent photo period of 11 to 12 hours per day is necessary to maintain healthy corals. The timer can be purchased at any hardware store for about $5. This is all the equipment required for the reef aquarium, except for certain maintenance items that will be discussed later. So far, we've only spent $80.

Furnishings:

What makes a reef tank a reef tank? Primarily, it's the presence of live rock. Live rock, as its name implies, is coral skeletons that have become inhabited by bacteria; micro and macroalgae; worms; sessile invertebrates, like corals, anemones, sponges, crustaceans and other marine organisms. It serves as the building blocks for your reef, as well as fulfilling a number of other important functions. Most important is the biological function it performs. Live rock actually reduces organic wastes from the fish and other animals living in the aquarium. The coralline algae (pink, purple or red microalgae with calcareous or calcium-containing cell walls) absorb nitrogen and phosphorous just as live plants do in a freshwater aquarium. In addition, live rock is full of holes, tunnels and crevices. These p rovide perfect habitats for denitrifying bacteria. In the outside of the hole, aerobic bacteria perform the familiar nitrification process (which is the same in saltwater as it is in fresh, though with different bacteria species) of converting ammonia into nitrites, then nitrites into nitrates. Toward the back of the hole where oxygen has become scarce, denitrifying anaerobic bacteria complete the cycle, converting nitrates into nitrogen gas. In addition to providing habitats for your animals, plants and bacteria, live rock also introduces a wide variety of organisms into your tank. These provide a diversity of organisms that can serve as food to other reef inhabitants, but mostly delight the aquarist as they are observed popping out of nowhere and growing into recognizable forms.

In this system, six to eight pounds of live rock will be needed. It's important to remember that the corals to be added to the system will come attached to live rock as well. Four or five pounds of live rock is a good starting point. To select live rock, use your eyes and your nose. Look first for rock encrusted with coralline alga.

Coralline alga is an extremely important component of the reef system. It is distinctively pink, red or purple and feels like wet chalk. In addition to removing organic wastes, it prevents unwanted algae from taking charge of the tank, as other algae are not able to grow on top of it. Next, look for other organisms attached to the rock.

Macroalgae (seaweed) is good for the tank and aesthetically pleasing. Live corals, sponges, tubeworms, snails and other animals are generally desirable as well. Basically, the best live rock is the live rock with as much "stuff" growing on it as possible. Look also for interesting shapes that will be used to construct the reef. After looking at the live rock, give it a good sniff. If it smells foul, don't buy it. It should smell like a clear ocean breeze, not a rotting pile of seaweed or a bait bucket that's been left in the sun. Premium live rock tends to cost between $5 and $7 per pound.

No furnishings other than live rock are needed for the system, however it may be more aesthetically pleasing to cover the bottom of the aquarium with gravel instead of keeping a bare tank floor. Use a small amount of crushed coral or aragonite gravel, at most 1/2" thick, preferably 1/4" or less. The size of the gravel does not particularly matter for the thin layer that will be used here. So far the total cost of the system is about $130.

Setting Up:

The obvious first step is to select a location for your micro-reef. It should be placed where it is easily viewed and readily accessible for feeding and maintenance. Direct sunlight should be avoided; it may cause undesirable algae

growth on the acrylic and sudden spikes in water temperature. As mentioned above, any flat, sturdy surface that will support 75 pounds is perfect. This can be a dresser in the bedroom, a desk at work, the kitchen counter, or the top of a toilet tank. The easiest way to test whether the surface will hold the aquarium is to sit on it first. If it breaks, find another surface. If it doesn't, it's plenty strong.

The quality of the water used in the micro-reef is extremely important. The presence of organic chemicals, pesticides, chlorine, and fertilizers will assuredly ruin your hopes for a healthy reef in spectacular fashion. Similarly, traces of metals in the water like copper, iron, lead or mercury will destroy your invertebrates and likely your fish a s well. While it might be assumed that the water is safe simply because it comes from the tap, a review of a printout from the local water company will probably be enough to warrant another source of water. It is probably wisest to use a de-ionization or reverse osmosis filter on the water to be used in the reef. If these are not available, distilled water can be purchased at the drug or grocery store. It's only a six - gallon tank, after all.

The salt mix must also be of the highest quality. Tropic Marine and Reef Crystals are premium salt mixes which contain all of the necessary trace elements and buffers for a healthy micro-reef. A bag of premium salt mix that makes fifty gallons of saltwater costs less than $20. A hydrometer will be needed for mixing the salt with the water to the appropriate salinity. This is a device that measures the specific gravity (spg) of the water, thereby indicating how much salt is dissolved in the water. A SeaTest hydrometer made by Aquarium Systems is sufficient for our purposes and costs about $12. It m u s t be mentioned that specific gravity and salinity are two completely different attributes of water. Salinity is the measurement of dissolved ions in t h e water. Specific gravity is the density of the water (weight/volume). For the purposes of keeping a relatively simple microreef the distinction is not particularly important.

Now, we're ready to fill the Eclipse. Start by mixing five gallons of saltwater in a five-gallon bucket. This may not be quite as easy as it seems. The first time you mix saltwater, use a set of measuring cups. For five gallons of water at least a cup of salt mix will be needed. Mix the salt into the water with clean hands (free of soap, hair products, nicotine, grease or anything else). A long-handled spoon or other mixing device could theoretically be used but it's not likely that the hands will stay dry anyway during setup or regular maintenance. The water will initially be white and cloudy. Let it sit until it clears, then measure the specific gravity with the hydrometer. The target spg will be 1.022 to 1.023. This is slightly higher than might be used in a fish-only aquarium but slightly lower than the average spg of the tropical oceans. If needed, add additional salt mix in small increments, each time allowing the salt to completely dissolve before measuring. Keep track of how much salt is put in each increment and when the target is reached, add up the increments so that the amount of salt mix needed for five gallons of water can be recorded or memorized.

Pour about half the water into the Eclipse and set aside the rest for the moment. If any gravel is to be used it should be added at this point. Make sure it is very well rinsed or it will cloud the water and leave nasty-looking deposits on the inside of the acrylic.

Now the tank is ready for live rock. Remove any wrapping that the live rock may have come with and simply place it in the tank. The live rock should be stacked to about two thirds the height of the aquarium. Be creative in this process; all too often reef tanks look like they were assembled like brick walls, unnatural and regular like they were, well, man-made. Use a good amount of time turning the rocks all different directions, making caves, coves, spires, shelves and other features that the inhabitants will eventually weave in and out of, or perhaps claim as their exclusive territory. Pieces of live rock often have a "good side" with noticeably more organisms growing on it. Put that side facing out and up so that the organisms can be viewed, and will receive the light that feeds them. The reef should not actually touch any of the walls of the tank as this will likely create dead spots devoid of essential water circulation. Take care that the rocks are stable since a freak landslide may kill prized corals or shrimp. To check, give the stack a gentle push from several different directions to make sure they're securely in place. It will be very difficult to rearrange the rocks once the reef is established, so make sure that reef the looks good, even without animals. Once the reef is built, add the remainder of the water and place the hood on the tank. Turn on the filter and let it run for a few days before turning on the light.

Now comes the hard part, the waiting game. Live rock often needs a good amount of time to "cure" once it's in the aquarium. Some of the organisms on the rock die from the stress of transportation and changes in water. The rotting corpses cause nutrient spikes, creating an environment that will not support any of the animals that the reef will eventually maintain.

One of the best ways to measure the curing process is by watching alga growth on the tank walls and on the rocks. Initially, algae will grow very quickly. As the live rock cures, it will slow down to a manageable level with regular maintenance. While the live rock is curing, water changes of about two gallons every week may be needed to reduce nutrient levels in the tank. Once alga growth slows down, it's time to start adding animals to the tank.

There are two problem algae to watch out for during this period and during regular maintenance. *Cyanobacteria* is readily recognizable. It coats the substrate and furnishings in an ugly layer in a variety of colors from blue-green to red to black, hence its more common name, slime algae. Fortunately it is easily removed.

Simply start a siphon with a narrow, flexible tube and suck it right off the substrate. Replace the waste water with newly mixed saltwater. Slime algae are not only ugly, but they can smother other beneficial organisms, blocking light and nutrients. The other problem algae are filamentous or hair algae. This looks like green fuzz growing on the rocks and is very difficult to remove once it has a foothold. At the first sign, initiate weekly water changes of two gallons. Start adding a l g a v o res (see livestock selection below) to attack the hair algae already in place. In the worst-case scenario, the rocks may have to be removed and scrubbed with a stiff-bristle brush dedicated to this purpose. Hair algae are not particularly dangerous to the reef organisms, but it looks bad and prevents other beneficial organisms like coralline algae from growing.

Livestock:

This is the fun part. Finally, the animals that inspired this project in the first place can be added. Don't get too carried away, though… the first rule of successfully starting a micro reef is to go slowly. There is a natural progression in which the animals should be added to the tank. First start with algavores. These serve an important purpose in the reef, but don't need to be boring or unnoticed. There are essentially three choices for the cleanup crew: hermit crabs, snails, and algavorous fish. Most fish, like tangs and lawnmower blennies, grow too large and are too aggressive for the six-gallon Eclipse, so they can be ruled out entirely. Once the problem algae are under control and the live rock appears to be growing coralline algae and other "good" organisms like feather-duster worms, sessile (non-moving, like corals) invertebrates may be added. If all goes well, a fish or decorative shrimp may be added to complete the system. Of course, it's not necessary or even advisable to keep all of the various decorative organisms discussed here. Space and nutrient management are the key to a successful micro-reef aquarium.

Two species of hermit crabs are appropriate for this system, Blue-Legged (*Clibanarius tricolor*) and Scarlet-Legged (*C. digueti,* also known as Red-Legged or Mexican Red-Legged) Hermit Crabs. Blue-Legged Hermits are easily identified by (no surprise here!) their blue legs with white and red bands at the joints. They are also somewhat smaller than their red cousins. Scarlet-Legged Hermits are easily identified by their astonishingly bright red legs. Their bodies are a pale orange or pink color. Hermit crabs are ubiquitous to all reef aquariums, barring only those that contain predators. A few moments watching them reveals why. Hermits are sufficiently entertaining to merit their own tank and look especially good featured in a small system. They scramble over the reef, daintily picking morsels from the rock while dragging their disproportionately large homes on their backs. You may periodically find "corpses." Before you despair an untimely death in the tank, realize that these are probably molts left behind by the growing Hermits. The addition of a few snail shells (usually available from the retailer that sold you the Hermits) may be a good idea to keep the little clowns from trying to evict a compatriot from its own shell as they grow out of their old ones. Hermits are excellent algavores and will also consume any uneaten food in the aquarium. In a six-gallon reef, as many as a dozen Hermits may be maintained, perhaps more, and the two species may be combined. Start by adding six or eight total. If a hair algae problem is evident, add more. Hermits usually cost two or three dollars each.

Another useful and popular algavore for the microreef aquarium is the Astraea (*Lithopoma tectum*) snail. These small snails, which look like rounded, spiral turbans with small lines of knobs following the spiral, readily eat diatoms (brown algae) and filamentous algae. I recently added five of these snails to a 45 gallon marine aquarium and they ate a substantial layer of algae on the front glass in less than a week. *Astraea* snails should not be confused with their larger cousins, *Turbo* sp. snails. Turbo snails, while also excellent algavores, grow too large for a small system. Check with your retailer to make sure you buy the right species. Astraea snails eat substantially more than hermit crabs, so fewer are needed. Start with two or three, but only if there is a

discernible layer of algae for them to eat. They may starve otherwise. If these are not controlling alga growth after a couple of weeks, add one or two more. Five or six *Astraea* snails are probably the limit for this reef system. They should cost about the same as hermit crabs.

Now that the live rock has cured and problem algae are under control, the system is ready for corals and their close relatives. There are thousands of species of corals in the world's oceans and probably hundreds available in the aquarium trade. A few of the easiest to keep will be discussed here. First, however, there are a few important general concepts to understand about corals and other cnidarians. *Cnidarians* (formerly *Coelenterates*, for those folks that may have taken high school biology before the reclassification) are animals, even though they may look quite vegetative or even alien. The phylum *Cnidaria* encompasses corals, anemones, jellyfish and hydras. The distinguishing feature of a *cnidarian* is its stinging cells. The cells contain a small harpoon, which is triggered by physical, electromagnetic or chemical stimuli. These harpoons come in many shapes, and may contain varying levels of toxins which may be injected into a predator, intruder, or ill-placed neighbor. Practically, this means that any *cnidarian* must not touch any other animal in the aquarium. Damage or death to one or both of the animals in question will certainly ensue. Most *cnidarians* kept in aquaria are structured as polyps. Large, single specimens, like anemones, can be up to three feet across. Others, like small polyp stony corals, are large colonies of tiny polyps attached to each other's tissue. A polyp has a foot at the bottom, a mouth at the top and a column in between. There may be tentacles around the mouth that can grab food and stuff it into the mouth. Rudimentary digestive organs, called mesenteries, are found inside the body column. Polyps usually only have one or two layers of cells and so are very delicate. The bulk of the polyp's mass is actually seawater; polyps can control the amount of water between cell layers and thus extend or contract depending on the situation. Many marine *cnidarians* have a symbiotic relationship with *zooxanthellae*, which are photosynthetic algae that live inside the *cnidarian's* cells. *Zooxanthellae* feed on the waste chemicals that are produced by the *cnidarian* and in turn produce sugars and other compounds, which the *cnidarian* uses as an energy source. These photosynthetic algae are the reason that a powerful light source of the appropriate spectrum and photoperiod is so important to the success of many corals and their relatives in captivity. *Cnidarians* are also able to absorb minerals and organic compounds directly from the ambient water. Ammonia, in small amounts, is actually an important nutrient for many *cnidarians*; calcium, magnesium, carbon and other minerals are also important. Only healthy *cnidarian* specimens should be purchased from a retailer. They should be well extended with uniform colors and without rips in the tissue. Bleached or patchy specimens are unhealthy and should not be purchased. Damaged specimens will not recover. Generally speaking, if the specimen looks good, it is probably healthy.

Corallimorpharians, commonly known as mushroom anemones or mushroom corals, are one of the most

popular *cnidarians* found in aquaria. These are individual polyps that look like disks with a small mouth in the center. They attach themselves to a hard substrate by a foot on their undersides. Mushrooms come in an astonishing variety of colors from red to blue to green to many shades of brown. They can have stripes, spots, rough textures or smooth. They come from pristine reef waters and muddy harbors. There is truly a mushroom for everyone. Mushrooms utilize photosynthetic *zooxanthellae* but don't necessarily need as much light as their stony cousins. Fortunately, they let you know what they think of their habitat. If they are getting too much light, they will not fully extend or will shrivel before the light goes out. You can solve this by placing the mushrooms farther down in the tank or in the shade, or by tilting the rock so that the light does not hit them directly. If they are not getting enough light they will extend themselves upward toward the light in a trumpet shape. This is also easily solved by moving the mushrooms up in the aquarium or by tilting them so that they can absorb more direct light. Over time, mushrooms will adjust the amount of *zooxanthellae* in their tissues to the level best suited to their environment and individual needs. They may also need a little help from the aquarist to adjust. If new mushrooms are not faring well, the photoperiod can be reduced to eight or nine hours per day, then gradually increased. Too much light can be a problem as mushrooms will actually "overeat" leading to high levels of dangerous hydrogen peroxide in their tissue. Iodine supplements can ease this problem (see the "Maintenance" section below). Healthy mushrooms are likely to reproduce in the aquarium. Frankly, this is a rather odd process. A glob of slimy-looking tissue is extended from the parent mushroom. A mouth will appear on the glob and the mushroom will start to take shape. Once the clone can support itself, the connection to the parent will be severed.

Mushrooms have a couple other "behavioral" idiosyncrasies. Some species actually feed by catching prey or debris on their discs. Once dinner is secured, the mushroom will turn itself inside out to consume it. In this state they look like rotting figs. When mushrooms are disturbed, they may expel their mesenteries (digestive organs). These twisted, white strings will be reclaimed in a few hours.

Another hardy choice of *cnidarians* for the micro reef is *zoanthids*, or *zoanthid* polyps. These are small, individual polyps that live in dense colonies but, with a few exceptions, are not actually attached to one another at the base of each polyp. *Zoanthids* also utilize *zooxanthellae* and should be placed where they will receive maximum light levels. They are particularly vulnerable to the stinging cells of other cnidarians so particular care is needed in placing them with a buffer zone between them and their neighbors. Healthy *zoathnids* will also reproduce in this system. A bud will appear at the foot of the parent polyp and will grow into a full-sized clone. As with *corallimorpharians*, the clone will separate from the parent once it is self-sufficient. *Zoanthids* can reproduce rapidly in and may cover large areas of live rock in the tank. If your colony is "too" successful, it may be necessary to remove covered live rock and return them to the dealer or trade them with a friend. Perhaps the most popular *zoanthids* are Yellow Polyps (*Parazoanthus*

sp.). As their name suggests, they are yellow in color, ranging from dark mustard to bright sunshine shades. They look essentially like hydras with tall columns and long tentacles extending from the crown. Their mouth is a bright yellow knob in the center of the tentacles. Most other *zoanthid* varieties have a wide disk on top of a stalk, with a ring of tentacles around the rim of the disk. They are usually brown and may have green iridescence and/or a brightly-colored center and mouth.

Identification of these species is tricky but care for all of them is the same. In fact, many *zoanthid* colonies for sale actually contain more than one species. Common varieties are sold as Button Polyps, Sand Polyps, Colony Polyps, Sea Mats (these are the polyps that attach to one another at the base) or simply *Zoanthid* Polyps. Take note that not every *cnidarian* sold as a "Polyp" is a *zoanthid*. Certain true corals, like Clove Polyps and Star Polyps, may have different requirements and should not be confused with *zoanthids.*

Corallimorpharians and *zoanthids* are not true corals. There are subtle morphological differences that distinguish them from corals, like the number of tentacles and the size and shape of the mesenteries relative to the polyp size. Few true corals that are appropriate for this system. A few that are often mistaken for zoanthids are exceptions: Green Star Polyps and Brown Star Polyps (*Briareum* spp.) could make a nice addition to this system. These look like *zoanthids* except that they form an encrusting brown or reddish mat from which the polyps grow. In a healthy colony, the mat will spread over the live rock and new polyps will pop up from the growth. Star Polyps may coat the inside wall of an aquarium, creating a very attractive black drop. Care of Star Polyps is similar to that of *zoanthid* polyps, except that they don't need quite as much light. Pulsing or Pumping *Xenia* (*Xenia* spp.) is another popular soft coral but is more demanding than *zoanthids* or *corallimorpharians.* It has stalks from which branches of polyps extend. When healthy, the feathery tentacles make a grabbing motion, opening and closing while swaying in the current, but *Xenia's* movement can pose a risk to other organisms in the tank. Make sure that branches do not touch other *cnidarians* as they sway in the current. *Xenia* is an active coral that provides fascinating movement in the tank. *Xenia* needs a lot of light, so it should be placed directly in the middle and top of the aquarium where the light is brightest. Varieties that are darker in color will be more successful as they have greater concentrations of *zooxanthellae.*

So what's a fish tank without any fish? In this system, it's perfectly reasonable to decide against keeping any fish. Most fish offered for sale in the trade will simply grow too big. If you decide to keep a fish, it should be added only after the population of *cnidarians* has been established for a few weeks. In my micro reef, I kept a single Pacific Yellowtail Blue Damselfish (*Chrysiptera parasema,* not to be confused with the Atlantic Yellowtail a/k/a Jewel Damselfish) very successfully. Yellowtail Damsels are striking royal blue with (no surprise here) a sunshine-yellow tail. They are playful and will spend much of their time in view. Their close relatives, Blue Devils, (*Chrysiptera cyanea*) also will not outgrow a six-gallon aquarium. Of course, the most popular family of

marine fish for aquaria is the clownfish. The most popular species of the family, the Percula Clownfish (*Amphiprion percula*) will stay small enough to keep in the system. *Perculas* are bright orange with three white bars and varying degrees of black around the bars and fin margins. Their comical swimming motion and bright color makes them extremely endearing. A *Percula* should be kept as a single specimen to avoid overloading the tank with nutrients. Neon Gobies (*Gobiosoma oceanops* and *G. evelynae*) are another possible choice and are perhaps the only fish that could be kept in a small group of two or three. They are black with a neon blue or gold stripe from nose to tail. They are long and narrow and typically only grow to two inches long. Unfortunately, their natural life span is only about one year, so they would have to be replaced periodically. Another goby commonly offered in the trade, the Citron Goby (*Gobiodon citrinus*), might also be considered but only as a single specimen. Finally, several members of the Genus *Pseudochromis*, commonly called Dottybacks or Basslets, may be considered. The Orchid Dottyback (*Pseudochromis fridmani*), Strawberry or Magenta Dottyback (*P. popheyreus*) and Fairy Basslet or Bicolor *Pseudochromis* (*P. paccagnellae*) each stay small enough to live comfortably in this system. While selecting a fish at a dealer, make sure that there are no obvious problems such as torn fins or external parasites or infection. Ask the dealer to feed the fish before you purchase it to ensure that it has adapted to life in an aquarium. Feeding fish and the other reef denizens will be discussed in the "Maintenance" section below.

Besides fish and *cnidarians*, there are a few other decorative animals that fare well in a micro reef. Common Cleaner shrimp (*Lysmata amboinensis*) are beautiful crustaceans that add quite a bit of character to the tank. They are golden-yellow with a narrow white stripe down their back and a wider red stripe on either side of the white stripe. They have long white antennae that sweep around looking for food and potential predators. The Cleaner shrimp's close relative, the Fire shrimp (*Lysmata debenius*), is another good choice. They also have long white antennae, but are colored deep scarlet with a few small white spots. Both species are cleaners in the wild, where they climb fearlessly onto large fish to pick parasites and bits of dead skin. They'll even venture inside the mouth of ferocious predators, such as groupers. In captivity, they may learn to hop onto their aquarist's hand to perform the same service. This is a trick that should be reserved for regular maintenance, when the water level in the tank is lowered and the aquarist's hands are free of any contaminants. Either shrimp can be kept as single specimen unless there are no fish in the system, in which case two or three may be kept and the species may be mixed. Two species of commonly available crabs make good reef residents as well. Emerald crabs (*Mithrax sculptus*) are uniformly gray-green in color and make excellent algae grazers as well as adding interest to the micro reef. Sally Lightfoot crabs (*Percnon gibbesi*), which have narrow purple, orange, brown and yellow stripes, are also good algae grazers and move around quite a bit more than the Emerald crabs. Both of these are also best kept as single specimens in a micro reef. Finally, there is a family of segmented worms that make beautiful additions to reef aquaria. Feather Duster worms construct a tube or burrow to protect their body. They then stick a plume of

tentacles out of the tube to trap plankton and floating debris. Small Feather Dusters are likely to appear in healthy live rock, but larger specimens are sold individually. They come in a wide variety of colors. Most of them have brown, gold and/or black striped tentacles, while others have pink and white stripes. When Feather Dusters sense movement, either by vibrations in the water or by sudden changes in light patterns, they rapidly suck themselves back into their protective tubes. After a few moments, they cautiously extend their tentacles again.

This list of animals should give a nearly limitless number of livestock combinations for a micro reef. The animals highlighted here are by no means the only ones appropriate, but are some of the most common and popular selections. There are many, many animals that are certainly not appropriate for this system.

Anemones, Giant Clams (*Tridacna* spp.), and stony corals (with a few possible exceptions) will almost certainly not survive in this system. Any fish or crustacean that grows to more than two or three inches is not appropriate and many others may damage other animals in the aquarium. Additional research is a good idea; a few resources are listed below. Most importantly, never purchase an animal without knowing what its needs and behavioral traits are.

Maintenance:

Maintenance of a micro reef should not be onerous and will become easy once a regular routine is established. Examine the aquarium's inhabitants on a daily basis. Note any differences in behavior, appearance and health of the animals. If an animal dies, whether mobile or sessile (non-moving), remove it immediately. Otherwise, the byproducts of decay will completely disrupt the balance in the reef and cause harm to the other animals. Take note of extraordinary algae growth and take appropriate measures (described below) if it continues unabated. Water loss from evaporation should be replenished periodically with fresh water (evaporation removes only water, not salt!). The water level should not be allowed to drop more than a half inch below the top frame of the aquarium. Otherwise, the salt level will rise and the splashing will leave salt deposits on the insides of the tank and hood. If there are fish, shrimp, crabs and other larger decorative animals in the aquarium, they will need to be fed. Feed a small pinch of general marine flake food three or four times a week. If there are Feather Duster worms in the tank, crush a flake or two into fine powder and add it to the reef. There should not be any noticeable amount of uneaten food about one half hour after feeding. Hermit crabs and shrimp will clean up most leftovers. Most reef inhabitants will appreciate periodic feedings of live or frozen brine shrimp, brine shrimp nauplii and Daphnia, if available. Daphnia and newly hatched brine shrimp are particularly good for *cnidarians* and Feather Duster Worms.

Perform a one-gallon water change every two weeks. Make sure that your hands are clean before starting maintenance. It may be wise to rinse them very well in warm water to ensure that no soap, shampoo, grease or anything else is left on them. DO NOT wash your hands in soap just before maintenance. The traces left on your hands will be enough to kill

many organisms in the tank. Before removing the hood to change water, remove any salt deposits (salt creep) that may have formed from splashing water around the filter. Remove the hood very slowly so that salt creep does not accidentally fall into the tank. *Cnidarians* can be burned by small pieces of salt that land on their tissue. If there's a gravel substrate, a small vacuum and siphon should be used to remove detritus from the gravel. If there is no gravel, a siphon tube should be directed under and between rocks where detritus buildups are noticeable.

Certain kinds of algae, such as *cyanobacteria* (slime algae) and filamentous algae, can and should be removed by siphon. Once a gallon of water or so is removed, wipe the inside of the aquarium even if there is little or no noticeable algae. Use an acrylic-safe sponge or pad, which is dedicated only to this reef system, to clean algae. It's probably a good idea to mix saltwater 24 hours before adding it to the tank to ensure that it is completely dissolved and stable. As mentioned in part one, high quality salt mixes contain all trace minerals necessary to maintain healthy animals in the reef. Iodine is a possible exception. Iodine can reduce stress in *corallimorpharians* and encourage rapid growth of coralline algae. If your mushrooms and coralline algae are healthy, don't bother with it. Iodine is quite toxic so great care must be exercised with it. Iodine reef supplements are available in liquid and powder form. Use half the suggested dosage for five gallons of water once a month. Liquid drops may be put into a small container of water and divided if need be (it's hard to measure half a drop!), then added to the mixed saltwater. Add the new water very carefully with the stream of water directed away from any *cnidarians*. Once the aquarium is refilled, replace the top and wipe the outside with a clean, dry, soft cloth. Acrylic can scratch! Test the cloth to be used on your cheek or inner arms to see whether there are any sharp particles or rough spots on the cloth that might scratch the tank. Every month the carbon and floss cartridge should be replaced. The light bulb should be replaced every nine to twelve months.

Trouble Shooting:

The biggest challenge in keeping a micro reef is controlling algae. If algavores are not keeping algae under control, it may be necessary to start a more aggressive regimen of water changes. One gallon every week or two gallons every two weeks should help reduce algae. A phosphate remover designed for reef aquariums may be necessary for particularly bad outbreaks. The photoperiod may also be reduced to discourage algae growth but this must be balanced with the needs of the animals containing photosynthetic *zooxanthellae*. There are a few "bad" organisms that may grow in a reef aquarium. One is Green Pearl algae (*Valonia*) which looks like green bubbles that grow directly on the live rock. *Valonia* will stress and possibly damage any *cnidarians* with which it comes into contact. In small numbers it is not harmful, but if the population of *Valonia* starts to increase, removal may be necessary. They can be removed from the rock with a pair of tweezers or deft fingers. *Aiptasia* anemones are another pest that can quickly grow out of control. They look like yellow polyps, but are an ugly brown color and can grow much larger.

Like their decorative cousins, *Aiptasia* uses powerful stinging cells to ward off neighbors and predators. In small numbers, they will not pose a problem to the other animals in the tank, but if their rapid reproduction is unchecked, they can overcome a small aquarium quickly. The best way to avoid *Aiptasia* is to not purchase live rock that has them growing on it. Even so, a couple of hitchhikers are likely to reveal themselves after the reef is established. Unfortunately, they are rather difficult to remove. One strategy for removal is to grab them with a pair of pliers and pull as much off the rock as possible. This prevents them from reproducing for a while, but they are likely to grow back. Peppermint shrimp (*Rhynchocinetes uritai*) are reported to eat *Aiptasia*, but they will also eat decorative *zoanthids*. Other methods, like injecting them with vinegar or boiling water with a syringe, have also been suggested. A full-blown outbreak will probably require outside research and a little experimentation.

Outside of controlling problem algae and *Aiptasia*, stress in *cnidarians* is probably the most likely challenge in keeping a micro reef. Other animals living in the tank may stress *cnidarians*. While the fish and crustaceans mentioned in this article are not likely to attack *cnidarians*, it's always an outside possibility. If another animal is observed irritating or attacking a *Cnidarian* regularly, you must make a decision whether to keep the stressed *Cnidarian* or the guilty party. A photoperiod that is too long or too short may also cause stress. Shriveled *Cnidarians* may appreciate a little less light for a period of time, followed by a gradual increase, so that they may adjust. Pale or weak-looking *cnidarians* may appreciate an increase in the photoperiod. Poor water quality will also cause stress in *cnidarians*. You may wish to periodically take a water sample in to an aquarium store for a broad-spectrum water test, especially if any of the animals appear to be struggling. If the results indicate a problem, initiate an aggressive water change regimen as described above. Finally, if nothing seems to work for a stressed *cnidarian* and it eventually dies, consider it a lesson learned and don't try that particular animal again.

Conclusion:

I hope this article inspires a few folks to venture into the wonderful world of marine reef keeping. Buyers beware, however; small reefs are known to be habit-forming and often turn into much larger ones! Since I started this article, Marineland has introduced a twelve-gallon Eclipse system that would be equally well suited to a simple micro reef, but will obviously cost more to set up and stock. Read as much as possible and don't be afraid to ask questions, but keep in mind that there are as many opinions on the art of reef keeping as there are fish in the sea. Experience is the key and keeping a reef is the only way to gain it. Enjoy the micro reef; it will treat you to hours of fascination.

References:

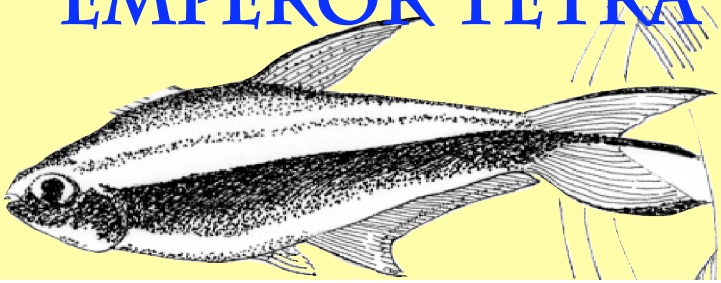
- *The Conscientious Marine Aquarist* by Robert Fenner
- *The Reef Aquarium*, volumes 1 and 2, by Charles Delbeek and Julian Sprung
- *Dr. Burgess' Mini-Atlas of Marine Aquarium Fishes* by Warren Burgess et al.

John Todaro BAS

ALL HAIL THE EMPEROR TETRA

Family: Characins
Scientific name: *Nematobrycon palmeri*
Common name: Emperor Tetra
Region: Rivers and streams of Colombia.
Size: 1 3/4 to 2 inches.
Temperature: Between 79°F-82°F.
Water quality: pH 5.0 to 7.8 and dGH 25°
Habits: Peaceful Good community fish, it should be kept with other peaceful species.
Food requirements: Not fussy. Live, frozen & flake foods.
Sex: Male is more colorful and has a longer hook-shaped dorsal. Female is general smaller without a hook-shaped dorsal.
Breeding: Not a prolific species.

ALL HAIL THE EMPEROR TETRA



An active and colorful fish, the Emperor tetra makes a good community fish if kept with other peaceful species. Like most tetras it does best if kept in schools. They look best in a tank with dark gravel and dense vegetation. Keep the light subdued. This can be achieved by having some floating plants in the tank; duck weed would be a good choice.

The male has an elongated dorsal and a well developed caudal fin. The anal fin is very long with a narrow dark band along the outer e d g e s . The female lacks the elongated dorsal and anal fin. Both males and females have an iridescent grass-green or blue green band that runs from the gill cover to the caudal peduncle.

Emperor Tetras are not very prolific species, but it is possible to breed them in a 10 gallon tank. Set up the tank with well aged soft, slightly acidic water, and a temperature of 81° - 82°F. Keep the light low and have the tank well planted or use a couple of large spawning mops.

To get the largest spawn, pick a pair and move them to the spawning tank. If you have more than a pair in the spawning tank, they will eat the eggs as the pair spawn.

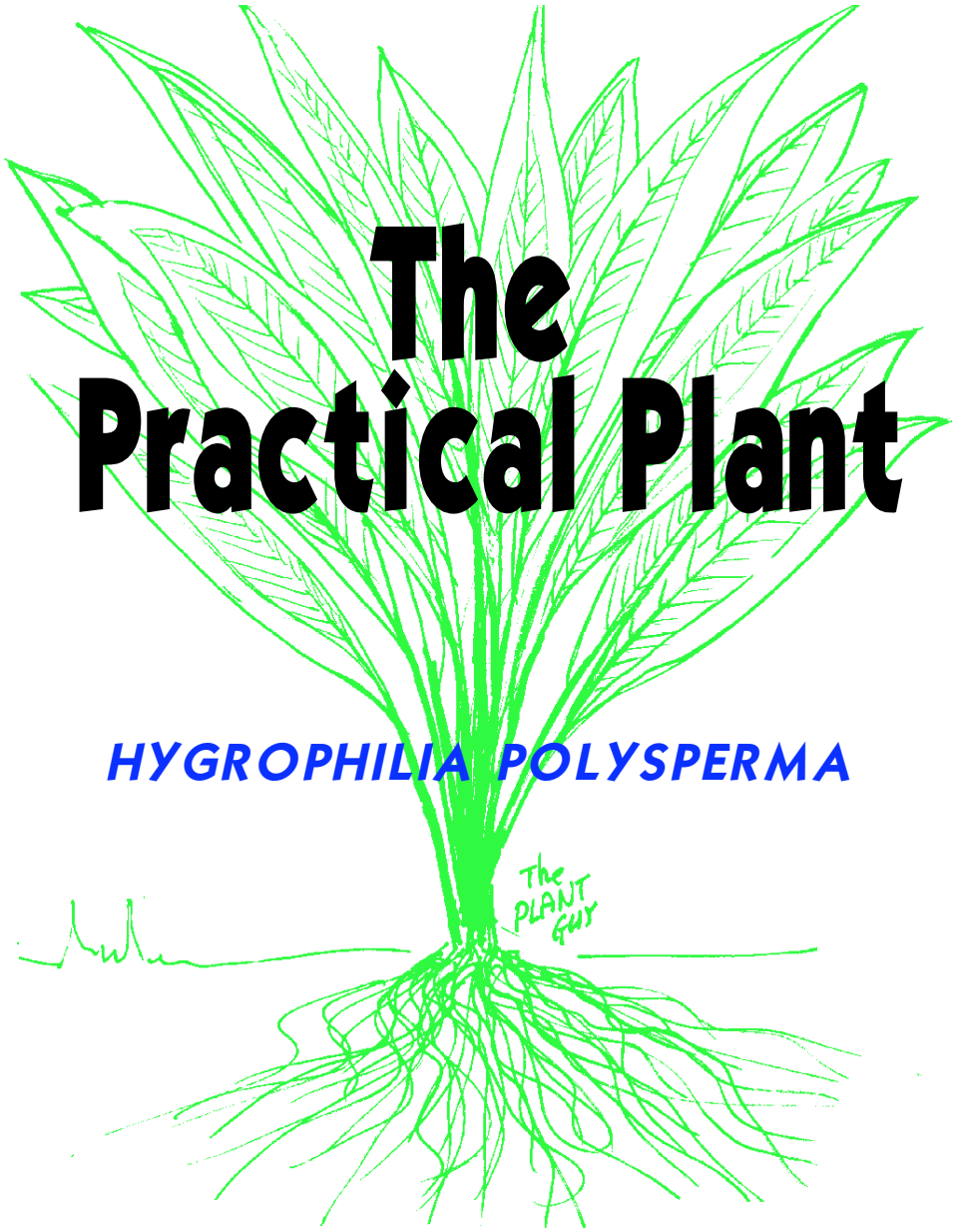
Introduce the breeding pair and feed live foods to get them into condition. The male will drive the female very actively. The female will lay eggs one at a time among the plants, like *Myriopyllum*, or the spawning mops. This will go on for several hours. Once finished, the parent should be removed, since they will eat their eggs.

The fry will hatch out in one or two days', once hatched, they should be feed very small live foods. After a day or so, they will be able to take newly hatched brine shrimp. The fry are hardy and not difficult to raise to maturity.

References:

- *Aquarium Atlas*, Vol. 1 H. Baensch, R. Riehl, Pub. H.A. Baensch, 1987
- *The Encyopedia of Freshwater Tropical Fishes*, Axelrod, Pub TFH, 1996
- *The Encyopedia of Tropical Aquarium Fish*, D. Mills, G. Vevers, Pub. Crescent Books, 1968
- *Aquarium Digest International* Vol. I, No. 3, 1972, Pub. Tetra, 1972

The Practical Plant



HYGROPHILIA POLYSPERMA

PHOTO ERIK OLSON

HYGROPHILIA POLYSPERMA:

This is a great plant, period. All right, I'll elaborate. I have a specimen of this plant currently in my guppy tank. Although at one time or another it has probably visited most of my tanks, or at least some cuttings from it. My specimen is a cultivar known as "Sunset Hygro." This plant used to be readily available at your local pet shop. Unfortunately, some fool (either intentionally or accidentally) released some into the wild, where it became a problem. To make a long story short, the plant is now on the Federal Noxious Weed list and can no longer be shipped across state lines. What was once a popular plant is now completely unavailable. The only way you will ever find this plant is if some club member brings cuttings in to auction.

My Guppy set up is in a 25 gallon tank. I keep all the males in this aquarium. The pH is about 6.8, temperature is kept at 78˚ and the GH runs about 60. This aquarium has 130 watt Compact Fluorescent lighting (Coralife "Aqualight" double strip) and CO2 enrichment. A Fluval canister filter (model #204) with the output being directed through a submerged spray bar is doing my filtration. I use the Estimated Index system of fertilizer dosing. This means that once a week I perform a large water change (50-75%). This is usually done on Saturday. Don't worry about the large volume of water being replaced; your fish will love it. This large water change is necessary to reset the system. Then on Saturday, Monday and Wednesday, I dose the macronutrients, and on Sunday, Tuesday and Thursday, I dose the micronutrients. Friday I take the day off. The lighting is timer controlled and on for 12 hours a day.

It is a shame that this plant has become so difficult to find. This plant has a lot going for it. It is easily cultivated, hardy and attractive. It's a stem plant that is tolerant of a wide range of aquarium condition. It can get rather large, but can handle the aggressive pruning needed to keep this plant under control. The plant has leaves that are lanceolate shaped and about 3" long. Two leaves, opposed to each other, emerge at each node. The leaves of the following node are rotated 90˚ around the stem axis. The "Sunset Hygro," when grown in proper lighting, is a bright light green color. Each leaf is etched in deep veins which are almost white in color. As the plant grows taller (and even closer to the light) the leaves start to take on a pinkish coloring. At the top of the plant the vegetative tip can become almost magenta. It has grown well for me under a variety of lighting and water conditions. Because of its branching and spreading nature it takes on a rather bushy and wild appearance. This is one of those plants that will help maintain good water quality because it is such a fast grower and an aggressive feeder. These fast growth and heavy feeding habits make it a great plant for combating algae. One of the really interesting things about this plant is the coloring. It is my understanding that the coloring of this plant is due to the activity of a virus which it harbors.

You heard all the good. Now we have to cover the bad and the ugly. This plant, as discussed, is very fast growing and highly aggressive. When I say fast growing, I mean that at the end

of the day you can see that the plant has grown since you turned the lights on in the morning. Sunset Hygro will branch profusely; virtually every node it has will branch unprovoked. Any branching stem which comes in contact with the substrate will take root and sprout more plants. It will also send out side shoots to root new plants, and of course taking cuttings will work as well. To propagate this plant all you really need to do is turn it loose in your aquarium. This plant behaves like it is on a mission to take over the planet! That is the big problem with this plant, and how it landed on the Federal Noxious Weed List. It will need frequent, and, at times, quite aggressive pruning.

Overall, it is a highly decorative plant that can be a real eye catcher in the aquarium. I highly recommend it, especially to those of you who enjoy lots of pruning.

EDITORS NOTE: Members with questions about aquatic plants or setting up a planted tank can contact **Isidore (Izzy) Zwerin,** our plant editor. You can call him at **(718) 449-0031** between 7pm to 10pm, Monday to Friday.

Breeding Dwarf Red Tail Shrimp

With the growing popularity of planted aquaria, the freshwater invertebrates are enjoying an increased demand as well. It's understandable since many of them are ideal for these setups. A few months back, I ran across some of these shrimp in **Animals and Things** This is a pet shop over in Woodbridge NJ, one of the few local places I can think of which carry freshwater shrimp with any regularity. I purchased all they had and put them in my 25 gallon guppy tank.

They are very happy in there and have been breeding. These shrimp belong to the genera *Caridin*a. There are over 120 different species of *Caridina* shrimp. It is almost impossible to identify these shrimp to the species level. The freshwater shrimp hobby is going thru much the same identity crisis as South American catfish, many of which are being identified by a number. *Caridina* shrimp are (for now) being identified by their common names or simply as a *Caridina* species or something else equally inaccurate.

Identification issues aside, this shrimp is fairly distinctive. They are very small. Adults will max out at about 3/4", females being slightly larger than males. Since the females carry their eggs under their abdomen, they are deeper bodied. Viewed from the side, their bodies are translucent. When viewed from above they are basically a dark brown with a row of triangles running down their back. These triangles are tan in color and are oriented pointing forward (I would have named them the arrow shrimp). The females, when carrying eggs, will become more intensely colored. *Caridina* shrimp have tiny claws and are completely harmless.

Their preferred water conditions make them compatible with fish like Guppies. And like Guppies, they can be delicate at first, but when fully acclimated and settled in are quite hardy. They will do fine at room temperature. They can tolerate temperatures up to 28˚C but in the long run they will do best a little cooler (23˚-25˚C). The pH

should be slightly acidic; 6.5-6.8 is fine. GH is important to these guys. Water which is too soft will not provide them with enough minerals to properly form their shells. I keep my GH in the range of 6°-7°, but do not allow it to exceed 10°. Many fish keepers raise their GH with Epsom salt. Epsom salt is composed of Magnesium Sulfate. While this may be fine for fish, I cannot endorse it for raising shrimp. The shells of shrimp are composed primarily of calcium, so magnesium is not really addressing their needs. I use Seachem's Equilibrium and or Seachem's Live Bearer Salt which contain a broader spectrum of minerals.

You can keep them in a small nano tank, but a mature planted aquarium is best. In the wild, these shrimp congregate in dense populations, so don't just get a few; get as many as you can. The *Caridina* shrimp are true omnivores. They will eat virtually anything organic. Food pellets, frozen foods like bloodworms and brine shrimp, algae, decaying plant leaves, dead fish and even the bio-film covering everything in your fish tank a re all on the menu. For the most part I let them eat the algae, or the occasional tidbit that my Guppies might miss. Hikari produces a specialty food called Crab Cuisine. It is developed for crustaceans and is high in minerals. I feed them some of this product at least once a week.

They will reproduce on their own, requiring nothing more than normal maintenance. The eggs are relatively large for such a small animal. They will range in number from about 20-40. The female will attach the eggs to her abdomen until they hatch. These eggs can range in color from a kind of dirty amber to a greenish color. The term for a female carrying eggs is "in Berry." The newly hatched shrimp are very tiny, but they are fully formed. They hatch in 28-33 days. Since the adults will not bother the hatchlings they do not need to be removed. The hatchlings are quite self sufficient. They will forage for food on their own, so no special feeding regime is required. The newly hatched shrimp will be almost impossible to find due to their small size and a habit of hiding among the plant leaves. When they get up to about 1/4" long they become less inhibited and you will start to see them everywhere. They do grow quickly when young.

I know this all sounds incredibly easy, but they do have a couple of special requirements that you will need to address. As any reef keeper can tell you, invertebrates are extremely sensitive to Copper. Even trace amounts can wipe them out.

Freshwater invertebrates have that same sensitivity. Obviously any medication that contains copper is out of the question, but Copper can get into your system by unanticipated means. If you have Copper water pipes in your home, you need to let the water run for a while prior to use because water standing in your pipes can absorb some Copper. You should also draw cold water and bring it up to temperature, since less Copper will dissolve in cold water than hot.

Another way that Copper sneaks into your system is by food. Some commercially prepared fish foods will contain Copper salts and are not suitable, so read that ingredient label. Their other special requirement is Iodine. The shrimp need this to molt properly. Make sure you use Iodine and not Iodide. I use Kent Marine Iodine and dose at a rate of 1/4 teaspoon per 25 gallons with my weekly 50-75% water change. That's all that's required, so have fun.

The following article was found by **Robert DeBonis** a BAS board member. He thought it would be of interest to our members and went ahead and contacted *Practical Fish Keeping* in the UK and received permission from **Matt Clarke**, Website Editor of *Practical Fish Keeping magazine*. Thank you, Bob, for finding this article and thank you, Matt, for letting us reprint it.

Listening To Mozart Makes Fish Grow Quicker

Aquarium fish that listen to classical music grow more quickly, according to the results of an unusual study by scientists from Greece.

Experts from the Department of Applied Hydrobiology at the Agricultural University of Athens played Gilthead seabream, *Sparus aurata*, piped-Mozart to see how they responded.

The experiment, which looked at the effects of music under different lighting intensities, saw the scientists playing the bream **Wolfgang Amadeus Mozart's** 'Romanze-Andante' from K525, or Eine Kleine Nacht Musik, via an underwater speaker.

The young fish that were played the music during the first 89 days of rearing grew better than those that only got to listen to the ambient noise of their aquarium's pumps and aerators.

The fish listened to Mozart every day, from Monday to Friday, but had the weekends off.

"Mozart's music was chosen because it is characterised by pure and single sounds, rhythms and melodies of relatively high frequencies and exerts a calming and almost clear anti-stress effect on humans," the authors wrote in the Journal of Fish Biology.

Gilthead bream are a popular food fish. Picture by Luis Miguel Bugallo Sanchez. Creative Commons.

Enhanced Growth

The study showed that the growth of the fish was enhanced in several ways.

"During the first 89 days of rearing, music resulted in enhanced growth. Nevertheless, at the end of the experiment (on day 117), no significant di fferences were found for body mass, but music treatment resulted in more homogeneous fish populations than controls."

The study claims that brain neurotransmitter levels were reduced when the exposure to Mozart coincided with brighter lighting, and feed utilisation was better when the music was played in four-hour sessions.

Applications

The scientists believe that fish farmers could use the findings to improve the quality of farmed Gilthead bream: "The present results provide the initial evidence that music transmission under specific rearing conditions could have enhancing effects on *S. aurata* growth performance, at least at specific fish sizes.

"Moreover, the observed music effects on several aspects of fish physiology (e.g. digestive enzymes, fatty acid composition and brain neurotransmitters) imply that music could possibly provide even further enhancement in growth, quality, welfare and production."

Previous studies have demonstrated that several different non-natural sounds transmitted to fishes have had "negative or no effects."

Hearing or Listening?

The scientists added that what the fishes actually perceived when the music was played to them remains unknown:

"Sound transmitted in the present study could have been just perceived as an increase in ambient noise (by 19db), a variation in ambient noise (as music piece chosen had its ups and downs), a novel previously non-existent sound within the tank, shock or enrichment and maybe as music per se."

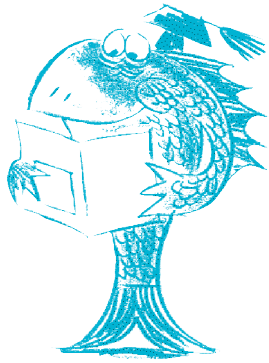
The same classical piece has been used in several other studies, including one on carp.

For more information see the paper:

Papoutsoglou SE, Karakatsouli N, Batzina A, Papoutsoglou ES and A Tsopelakos (2008) - Effect of music stimulus on gilthead s e a b ream *Sparus aurata* physiology under different light intensity in a recirculating water system. Journal of Fish Biology (2008) 73, 980-1004.

Izzy Zwerin BAS

Exchange Editor's Report



Hi, everybody. This is not **Vinny Babino** bringing you this report. It's **Izzy Zwerin** trying to fill his witty shoes. Until further notice, I will be filling in for him. Now that I've tried out the position of Exchange Editor, I can see why this is the job that everyone wants. It's great to get to read all the publications from aquarium societies around the country. The hardest part of this job is remaining objective, since we all have our own favorite fish. I'll give it a try.

Let's start with the Aug '08 issue of *Modern Aquarium*, which is published by the Greater City Aquarium Society. A great article appears by **Alexander Priest** on growing Microworms titled *"My Microworm Recipe."* Everything you ever wanted to know about growing this tasty and nutritious fish favorite is all laid out. I highly recommend you try this; your fish will love you. [See our BAS publication, *"Scrumptious Meals & Live Food Treats,"* for more information on the process.]

In the July '08 issue of *Modern Aquarium*, Alex appears to still be on a roll. In this issue, there is a great article on The Pearl Gourami (*Trichogaster leeri*). The article supplies general information on topics like feeding, natural environment and behavior. What really makes this article a hit is the in depth information about breeding and raising fry. I really enjoyed this article; nice job, Alex. Thanks.

The September '08 issue of the *Buckeye Bulletin*, put out by the Ohio Cichlid Association, contains a noteworthy article on breeding *Corydoras barbatus*. The article is written by **Tom Wojtech** and it details the repeated trials Tom went through trying to breed this fish. The article is both informative and entertaining. Thanks, Tom, this is one I might just try myself. In the same issue, there is also a nice article on breeding another catfish, Aspidoras goia. This article is by **Michael Pham**. Thanks, Mike. What happened, guys? I thought you were a Cichlid club!

One of the most outstanding articles I have come across is in the September '08 issue of The *Granite – Fisher.* This publication comes to us from our friends at the New Hampshire Aquarium Society, written by **Grant Gussie** and called *"Hitching a Ride: Continental Drift and Aquarium Fish."* It's a fairly long but well written article which explains the relationship between various fish and their location on the planet in the context of the theory of Continental Drift. This article is very interesting and informative. Thanks for this one, Grant; it's definitely a keeper.

If you're interested in reading any of these articles, contact Izzy at a meeting or call hin at 718-449-0031. There is a small copying fee of 25¢ per plus postage if articles are mailed. No postage if you pick up the article at a meeting.

All Members Are Invited To The BAS Annual Holiday Party

It's that time again...time to party! Come on down and have a blast! If you are new to the BAS, let me explain what it's all about The BAS supplies a turkey, all the dressings, a baked ham, desserts, coffee and soda. Our our fantastic members...that's you... bring favorite dishes, desserts, mouth watering home baked pies, cakes, delicious hot dishes ranging from pasta, baked chicken, sausage and peppers, salads, plus an array of ethic foods, too many to mention.

You can enjoy all this at a sit-down dinner with your friends. Members are encouraged to bring their families, close friends and significant others.

The doors open at 7:30pm. The dinner starts at 8pm. Please wait until we set up arriving dishes on the serving tables. If you start too soon, you may miss some fantastic dishes. You don't want to do that!

All dishes will be listed and the donor acknowledged in the January 2009 *BAS Bulletin*. So remember to check in with **Denise** or **Stu**. Give them your name and the dish you've brought.

We play **Fish Bingo** for aquarium-related prizes.

At the party, we also honor members with awards who have served the society for the past year, and members who have written articles for *Aquatica* and award them with aquarium books.

If you have written for *Aquatica*, or the *BAS Bulletin* or have helped the society in the past year, you might be one of the people we honor that evening. So come on and join us for a fun evening and great food.

One of our esteemed members is **Kenny Kohn,** head chef at **Katz's Deli** in New York. He donates trays of their fabulous corned beef, pastrami, knishes and pickles. Naturally, it's always been a great hit. I have been asked to remind you all to take only what you can eat, so all the other members can enjoy Katz's Deli fab food! My mouth is watering just thinking about it.

So come on down; bring a dish. If you don't cook or don't have the time to cook, bring something from your local deli. We'd love to have all our members and friends come and celebrate the holidays with us. Remember, it's your society, and we want you to enjoy the benefits of membership.

SEASONS GREETINGS & HAPPY NEW YEAR
FROM THE PRESIDENT, OFFICERS & BOARD

Membership Application Brooklyn Aquarium Society 2008/2009

Meetings are held at the NY Aquarium Education Hall on the 2nd Friday of the month at 7:30pm. Knowledgeable speakers on fish care and culture, door prizes, raffles, and fish auctions. All meetings are free to members.
Visit us on line: BROOKLYNAQUARIUMSOCIETYORG

Educating Aquarists Since 1911

NAME_____OCCUPATION_____

ADDRESS_____CITY_____STATE____ZIP_____

PHONE (DAY) _____(EVE)_____(FAX)_____

E-mail Address_____

TYPE & LENGTH of MEMBERSHIP: (CHECK ONE)

INDIVIDUAL				FAMILY				[ ] $15 STUDENT 1YEAR (UNDER 18 YEARS)
1yr. $20	2yr. $36	3yr. $51	4yr. $68	1yr. $25	2yr. $45	3yr. $63	4yr. $85	

* If family membership, please list all family members. **Only first two listed will have voting rights.**

1_____ 2_____ 3_____

4_____ 5_____ 6_____

Number of tanks [ ] marine [ ] freshwater [ ] Do you breed fish? [yes] [no]

If yes, what types do you breed:_____

_____

Special interest (if any)_____

_____

How did you hear about BAS?_____

[friend] [dealer] [flyer] [Aquatica] [mag ad] [online] **other**_____

To volunteer check [yes] [no] *A board member will get in touch with you if you check yes.*

On occasion the Brooklyn Aquarium Society uses its mailing list to send notices of interest to our members. If you **DO NOT** wish to receive these mailings please check here [ ]

Official use

Member number:_____ Type of membership [F] [I] [S]
Date paid:_____ Board approved date_____
Amount paid:_____ Renewal/member since_____

Mail This Form Or A Copy And Your Check Payable to Brooklyn Aquarium Society to
BROOKLYN AQUARIUM SOCIETY, ATT: Ms. LITA GOLDBERG, MEMBERSHIP CHAIRPERSON
P.O. BOX 290610, BROOKLYN, NEW YORK 11229-0011

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ABSOLUTELY FISH

Absolutely Fish's staff is knowledgeable and can help you solve your aquatic problems. They offer a 15% discount on select fish, marine life & supplies when you present your current BAS membership card. A really great aquatic shop and well worth the trip. Make a day of it!

Absolutely Fish
1080 Route 46 West Clifton, NJ 07013
Ph: 1 (973) 365-0200
Open 7 days a week: Mon-Fri 12-9 Sat 12-8 Sun 12-5

ALTI@ALTISREEF.COM

Alti'sReef.com Check out Rob's web site to see what's in stock. Discounts for current BAS members. Purchase over $125 and get a free frag, and free shipping! Guaranteed overnight delivery to most locations in continental U.S. via U.S. Postal Service Express Mail.

alti@altisreef .com
Alti's Reef 83 Chariton Dr., East Stroudsburg, PA 8301

PET SHANTY

Pet Shanty Family owned & operated; stocks 3 rooms of freshwater fish & 1 of marine fish & corals. They stock a vast list of fish which is posted on line at http://petshanty.com. They also carry other pets and pet supplies. You've got to check them out; they probably have the fish or corals you want.

Pet Shanty
2507 U.S. Hway 22, Scotch Plains, NJ 07076
Ph: 1 (908) 889-8262 • Fax: 1 (908) 889-0803
Mon-Fri: 10am-9pm • Sat: 10am-7pm•
Sun 10am-5pm

AQUARIUM ADVENTURE SUPERSTORE

Aquarium Adventure Superstore has 500 tanks of freshwater, marine fish & corals and a great selection of equipment. **Scott**has a special 50% off all fish with a 5 fish limit, and 30% off any one item, except tanks and tank kits. Not to be combined with any other offer. Discounts to BAS members with current card.

Aquarium Adventure Superstore
177 Glen Cove Road, Carle Place, NY 1 1514
Ph: 1 (516) 294-9699 www.aquariumadventure.com
Mon-Sat 10-9 • Sun 11-6

PETLAND DISCOUNTS

Petland Discounts the complete pet store carries a full line of pet supplies for fish, dogs, cats, birds, reptiles and small animals. They also carry a variety of fish, birds, small animals and reptiles. Open 7 days a week. Locations in New York, New Jersey & Connecticut with over 15 stores in Brooklyn. You can shop on line at: **wwwpetlanddiscounts.com**See the white pages, or their ad on page 22 for a store near you.

PACIFIC AQUARIUM & PET INC.

Pacific Aquarium & Pet Inc., in Manhattan's Chinatown, carries ornamental goldfish, koi, freshwater fish, & aquatic plants. BAS members get 10% discount with current membership card (Discounts not to be combined with other specials). They have a full line of aquarium supplies, and you can order custom size tanks.

Pacific Aquarium & Pet Inc.
46 Delancy St., NY, NY 10002 • Ph: 1 (212) 995-5895
Open 7 days a week and all holidays 10am to 7:30pm

PLEASE PATRONIZE OUR SPONSORS. THEY SUPPORT US. WE MUST SUPPORT THEM!

Aquatic Express Inc.

Aquatic Express Inc., specializing in marine fish, corals & aquaria. Tell them you're a member of BAS and you will get 10% discount on corals in stock.

Aquatic Express Inc.
451 Grandview Ave., Ridgewood, NY 11385 Ph: (718) 456-3020
Mon - Fri: 11am - 8 pm, Sat: 11am - 7pm, Sun: 11 am - 6pm

AQUATIC WILDLIFE

Aquatic Wildlife, features 11,000 gallons. of freshwater fish, plants & marine life. Discounts to members with current membership card. Well worth the trip.

Aquatic Wildlife,
179D Demming St, Manchester, CT 06040
(In Panera Plaza)
Ph: 1 (860) 648-1166
www.aquaticwildlifecompany.com

BROOKLYN ZOO & AQUARIUM INC.

Brooklyn Zoo & Aquarium Inc. is a classic pet shop. They have a full line of aquarium supplies, freshwater, marine fish and corals and offer a 10% discount to BAS members with presention of a current membership card. Some restrictions apply.

Brooklyn Zoo & Aquarium Inc.
2377 Ralph, Ave., Bklyn, NY • Ph: 1 (718) 251-7389
Hrs: Sat-Sun & Mon 10am - 6pm Tue-Fri 10am - 8pm

ROYAL AQUA WORLD INC.

Royal Aqua World Inc. has over 100 tanks of marine fish, hard & soft corals, freshwater fish, goldfish & koi imported from Japan, plus plants and pond supplies. BAS members get a 10% discount on all purchases with a current membership card. Open 7 days a week.

Royal Aqua World Inc.,
815 65th St., Bklyn, NY 11220
Ph: 1 (718) 238-0918
Hrs: 7 days a week 10:30am-8pm

Wonderful World of Fish n' More

Wonderful World of Fish n' More . A full line aquarium store w/maintenance & installation services. A beautiful retail store with over 2,500 gallons, dedicated to marine fish & corals. They take pride in offering the best customer service, competitive prices & healthy livestock.

Wonderful World of Fish n' More
25-71 Steinway St. (between 28th & 25th Ave.)
Astoria, NY 11103 • Phone: (718) 278-0708
Hrs: Mon-Fri: 12am-9pm • Sat: - 11am-8pm
Sun 11am-7pm

"C" The Jungle Pet Store

"C" The Jungle Pet Store located in the heart of Brooklyn carries a full line of pet supplies, tropical fish, birds, and small animals. They also offer a 10% discount to BAS members with a current membership card. Stop in and see what new livestock has arrived.

"C" The Jungle Pet Store
247 New Lots Ave., Bklyn NY 11207
Ph: 1 (718) 649-2536
Hrs: Tue -Sat 10am-8pm • Sun 10am-6pm

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Divine Wood, 128 Port Richmond Ave., Staten Island, NY. 718-981-9222.
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