AQUATICA

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104 Years of Educating Aquarists

AQUATICA

VOL. 28 MAY - JUNE 2015 NO. 5

Contents

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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:

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Brooklyn Aquarium Society
Calendar of Events ~ 2015·2016

2015

MAY 8 Giant Spring Auction ~ Freshwater fish, plants, marine fish, aqua-cultured corals & dry goods including a new 55 gal. tank & stand.
JUN 12 Lou Ekus ~ (Tropic Marin USA) Basics of Reef Chemistry ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction. BAS elections.

JULY/AUGUST - NO MEETINGS

SEPT 11 Rick Borstein ~ 60 Tips in 60 Minutes ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.
OCT 9 Giant Fall Auction ~ Freshwater fish, plants, marine fish, aqua-cultured corals & dry goods, including a new 55 gallon tank & stand.
NOV 13 Bob Fenner ~ Reef Stocking ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.
DEC 11 Holiday Party ~ Members, their families and friends, all you can eat sit-down dinner ~
• Fish Bingo & Prizes • BAS awards presentations.

2016

JAN 8 Jeff Bollback ~ Getting Rich Breeding Fish ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.
FEB 12 Joe Caparatte ~ Triton Method ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.
MAR 11 Speaker TBA ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.
APR 8 Speaker TBA ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.
MAY 13 Giant Spring Auction ~ Freshwater fish, plants, marine fish, aqua-cultured corals & dry goods including a new 55 gal. tank & stand.
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JULY/AUGUST - NO MEETINGS

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DEC 9 Holiday Party ~ Members, their families and friends, all you can eat sit-down dinner
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The Giant Spring Auction

THE **GIANT SPRING AUCTION** WILL BE HELD ON MAY 8TH. We will be auctioning bags of hard to find and rare fish, also perennial favorites plus aquatic plants, marine fish and corals will be among the lots. Please arrive early to view the lots from 7:30 pm to 8:30 pm.

The auction starts promptly at 8:30pm. We will auction a new 55-gallon tank & stand donated by our friends at **Petland Discounts**. If you win the tank, you will be given a certificate signed by **Joe Graffagnino** to pick it up at a designated **Petland Discounts** store. This way, you can make arrangements to get it directly from a local **Petland Discounts** store at your convenience.
We accept personal checks from members we know. **For more information,** please see the ***BAS Bulletin*** or visit **BrooklynAquariumSociety.com**

William Berg
of Sweden, for aquaticcommunity.com, *Aquarticles*

BREEDING CLOWNFISH

A short description

Thanks to Disney's motion picture "Finding Nemo," almost everybody is familiar with clownfish.

Clownfish, or Anemonefishes, from the family *Pomacentridae*, are one of the easiest tropical marine aquarium fish to breed. Clownfish regularly lay eggs in aquariums. They have quite large eggs and larvae, and since the larvae easily eat cultured live foods, raising them is somewhat simpler than it is with many other marine species.

You need to get a pair if you want to breed clownfish, and that's quite interesting -- believe it or not, clownfish are all born as males! When they are adults, the largest and the most dominant fish of the group will undergo a sex change and become a female. The second largest usually becomes the breeding male, while all the other fish remain juveniles and gender-neutral. If the breeding female disappears, the breeding male will change to a female, and so on. Buying an established pair may be a reasonable way to go, but it is often better to have a group of juveniles growing up together. If you choose to buy a pair, you should look for a pair that goes around together. Sometimes you can be lucky enough to get a pair already spawning. Anyhow, establishing an adult pair can be a little tricky; you need to keep your eyes on them to make sure that the female doesn't kill the male.

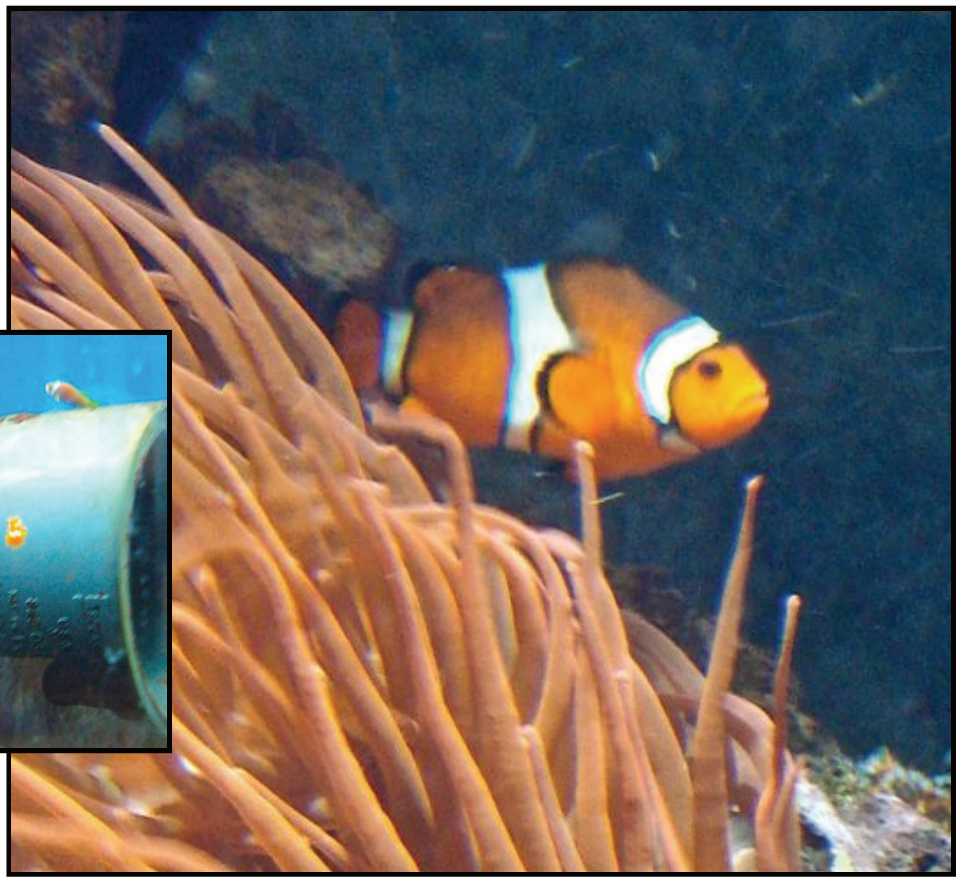
The next thing is to set up the tank. The tank should be large enough, approximately 200 liters for the breeding pair. It is better to keep a pair alone in an aquarium when trying to spawn clownfish.

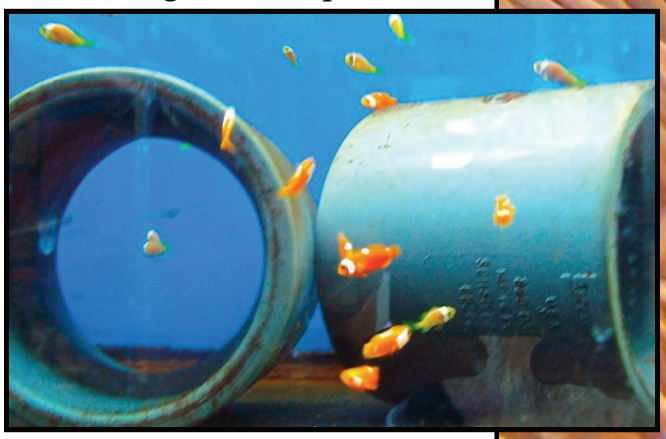
The aquarium should be furnished with a nice anemone, a few live rocks and other rocky substances with a vertical surface, a layer of coral sand on the bottom, bright lighting, good filtration, and a protein skimmer. Your clownfish should be stress free, which means no aggressive tank mates and good water quality. As for feeding, clownfish need a mixed diet of fresh raw seafood and vegetables. A good diet includes prawns, mussels, and squid. It is best to feed small bits at regular intervals.

Spawning can begin 1 to 12 months after the fish have settled into their new home. When the fish are ready to spawn, they become very aggressive. The male clownfish will dance up and down in front of the female (also known as "clownfish waggle"). They will also start to clean their selected rock by robustly biting it. The spawning itself usually occurs in the afternoon or early evening. Once the spawning is complete (within several hours), the male takes on responsibility for attending the eggs, whereas the female acts as protector of the eggs and supervisor of her male.

Spawning is likely to occur again at intervals of 12 to 18 days. The eggs should be left in the care of the parents and not removed, unless the parents are known to be egg eaters. At first the eggs are a bright orange colour, but after several days this diminishes and the eyes appear. Hatching usually takes from 6 to 15 days, depending on temperature.

The most critical stage of the fry is the first 10 days of their larvae span. If you can get your fry to survive this period the rest of their raising should be easier.





Clownfish fry in rearing tank at the Long Island Aquarium.

Anthony Kroeger - BAS

Observations on Batfish

Platax pinnatus

Can *P. pinnarus* be successfully kept in the aquarium?

I like batfish. *Orbi*, *tiera* and *Pinnatus* all are interesting and beautiful in my opinion. As an importer, I've had multiple opportunities to work with each. Yes, I know conventional wisdom says most *Pinnatus* starve to death in the aquarium and should be left on the reef, and I do not dispute this statment, for the most part...

But I also believe that in order to learn how to maintain our fish, we have to try and experiment with different strategies. I feel our current understanding of *P. pinnatus* batfish may be erroneous.

The following observations are based on personal experiences and not long term scientific study. I welcome any comments or opinions on batfish. Please write me c/o BAS.

My observations are based upon the following assumptions.

1] Most animals are fairly hardy in their natural environment. If not, they would be extinct.

2] Most animals feed opportunistically in nature. Very few animals survive on only one food alone. One food alone is unlikely to provide all the necessary proteins, carbohydrates, vitamins and minerals needed for survival.

3] In spite of our best efforts, aquariums are not natural environments; they are just a similar approximation.

4] Likewise, most foods we offer are similar approximations. Do our fish recognize their color, texture or placement as food?

5] Finally, most animals in a particular family have similar basic needs, with varying particulars based upon the animals individual environment.

Batfish are native to the Indo-Pacific. Orbiculate Batfish, *Platax orbicularis* and *Platax teira* Batfish, *P. teira* are relatively easy to keep and feed well. So why do *P. pinnatus* batfish usually starve?

I want the best for my fish and to keep them healthy and for them to live long lives in my aquariums. So the question above I experimented with to see what kind of results I could obtain. I hope others will experiment with these ideas too.

Platax orbicularis

I looked at all the parameters of batfishes' natural environment that I know of and applied them to my aquariums. Some of my results are very interesting and need more research and observation, hopefully from marine aquarists.

P. pinnatus

Batfish come from coastal reefs and mangrove shoreline estuaries. So I examined the following:

1] Would juvenile *P. pinnatus* bats feed in a estuarial environment?

Estuaries go through tidal/salinity fluctuations frequently. So I lowered the salinity to 1.017 -1.018 very gradually. I added small mangrove (red) which are common in Florida as well as mangrove seed pods. I used a coral sand substrate, a canister filter and airstone. I set up three 55 gallon aquariums all set-up as mentioned above.

The temperature was kept at 76˚F. lights on 14 hours a day.

In tank #1 - I put one 3" *P. pinnatus* Batfish alone.

In tank #2 - I put one *P. pinnatus* bat 3", four small 1 1/2" *Monodactylus argenteus* and one 3" *P. orbicularis* Batfish.

In tank #3 - I put one *P. pinnatus* bat 3" one 3" *P. teira* Batfish and three small 1 1/2" *Monodactylus sebae*.

All specimens were freshly imported fish. The *M. sebae* are common estuarial fish and I wanted to use them as both dithers and to show a feeding response to the *P. pinnatus*. I added the *P. teira* and *P. orbicularis* Batfish to elicit a mimicked feeding response. Monkey see, monkey do, essentially.

For the first week, I introduced into tank #1 - Frozen brine shrimp and high quality flakes and the *P. pinnatus* refused all food.

In tank #2, the *P. pinnatus* had a feeding response but spat out all food. Plus its feeding response was slow. The *M. argenteus* got most of the food.

In tank #3, the *P. pinnatus* stayed near the *P. orbicularis* batfish and did eat, not heartily, but it did eat. The *M. sebae,* being more sedate than *M. argenteus,* also encouraged the *P. pinnatus* to come out more front and center. What I found interesting about the *P. pinnatus* in tank #2 and #3. was that both species of batfish picked at both the mangrove roots and seed pods - relatively

Monodactylus sebae

frequently, in fact. The *P. pinnatus* in tank #1 was losing weight; *P. pinnatus* #2 was about the same and *P. pinnatus* #3 showed no weight loss, but no gain either. I had never seen *M. sebae* eat off of roots and seeds before.

For the second week, I thought I would see if I could make the mangrove roots and pods more interesting.

For all three tanks, I selected one root and one pod for "food" enhancement. I set the root and pod upright.

For tank #1 - I made a paste of spirulina, brine shrimp, crushed krill and Reed Mariculture's ™ Instant Algae®. I painted a root and seed pod with this mixture and placed them in tank #1.

For tank #2 - I did the same, but added beef heart and store bought fresh popcorn shrimp to the mix.

For tank #3 - I did the same, but also added Mysis shrimp and soaked the mix in Ocean Nutrition's™ HUFA Enriched Brine Shrimp.

THE RESULTS WERE:

Tank #1 - The lone *P. pinnatus* did nibble consistently on the "enhanced" root and pod, but spit everything out. A noticeable improvement, but it was still starving.

Tank #2 - The *M. sebae* went crazy and cleaned the root and pod before the batfish got much of a chance to eat.

Tank #3 - The *M. sebae* and both batfish nibbled on the roots and pod and kept the food down. The feeding response was much stronger.

The next day, I removed 2 *M. argenteus* from tank #2. I put one into tank #1. I also put the formula from tank #3 onto a root and one seed pod in all three tanks.

Monodactylus argenteu

THE RESULTS WERE:

Tank #1 - The *P. pinnatus* nibbled with the *M. sebae*. It did not feed strongly, but did keep the food down.

Tank #2 - This time both batfish fed moderately and kept the food down.

Tank #3 - These batfish had a strong feeding response, eating off the root and pod just as much as the *M. sebae*. Not only that, but the *P. pinnatus* stomach was extended when it was through feeding.

I kept this up for 2 more weeks. By then, all three *P. pinnatus* were eating. The one in tank #3 the best.

Tank #1 was the worst, but at least it had stopped losing weight.

2] Would the *P. pinnatus* continue to feed once moved to a reef tank from the estuarial tank? Well, yes and no!

I moved the strongest *P. pinnatus* from tank #3 into a reef tank and added a dried coral head painted with the food mixture. It nibbled at it, but not nearly as much. So I again painted a root and pod and set them upright in the reef tank. This time the *P. pinnatus* ate well. It continues to eat off the root and pod until I sold it after about 8 weeks.

THESE EXPERIMENTS RAISE MANY QUESTIONS:

1] Would *P. pinnatus* thrive long term using this formula on a feeding root and pod method?

2] I do not think it was so much of a problem of what the food was, but rather the delivery of it. Perhaps do *P. pinnatus* migrate from mangrove estuaries to reefs and change their food sources enroute? Do they adapt gradually to eating from reefs?

3] Would adult *P. pinnatus* not eat from roots and pods? Is it only a juvenile food?

4] Did the dithers play an essential role in eliciting a feeding response? Was the other batfishes' presence a catalyst to feeding?

I really do not know the answers to these questions. But I plan on experimenting further. I encourage other aquarists to do the same. Please write me with your results. I truly believe *P. pinnatus* can be kept healthy, long term in the aquarium.

It's a matter of gaining knowledge of these beautiful fish. I hope this gives you some initial ideas.

Until next time.

Tony

The Practical Plant

PROPAGATING *PROSERPINACA PALUSTRIS*

THE MERMAID WEED

Proserpinaca palustris is better known as Mermaid Weed. It has to be the strangest stem plant I have ever dealt with. That being said, it is also one of the most decorative plants I have ever seen. It has leaves which are essentially elliptical in shape. The leaf edges are somewhat pinnate. However, as the plant grows taller and gets closer to the light it becomes increasingly more pinnate. The upper leaves become so pinnate that they look like a slim triangle with a row of long needles around the edge. There is a color change as well. The lower leaves are a dark green and, again, as it gets closer to the light it becomes a lighter green. The uppermost portion becomes a bright red. In addition to this odd growth pattern it is also the slowest growing stem plant I have ever worked with.

This is no plant for beginners. It requires a great deal of light and nutrients and CO_2. I am keeping this plant in my Guppy tank. This set up is in a 25 gallon tank. I keep all the males in this aquarium. The pH is about 6.8-7.0, temperature is kept at 78˚F and the GH runs about 60. This aquarium has 130 watt Compact Fluorescent lighting (Coralife "Aqualight" double strip) and CO_2 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. You don't have to worry about the large volume of water that is 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

To propagate this plant, just treat as you would any other stem plant. Take a cutting and place it into the substrate. You will need to be very patient with this plant. To give you an idea of just how slow growing this plant is, in the high growth environment I described to you, I have only had to prune this plant twice in four months. It is also reluctant to form any branches.

All this being said, if you can maintain *P. palustris*, it is a stunning plant.

Izzy

Ian Fuller – BAS

STARTING WITH CORYDORAS

Over the years I have been asked many questions about keeping and breeding *Corydoras* Catfish by people that would like to start keeping them and others that have them, but would like to try and breed them. The ten most popular questions I have listed below. The answers I have given to these questions are based on the many years of experience I have gained by keeping and breeding these wonderful little fishes, and are meant as a guide rather than the rule.

QUESTIONS

1. How big do they get?
2. How should I set up a tank for them?
3. How many can I put in my tank?
4. What species are best to start with and how expensive are they?
5. Where are the best places to get them?
6. What should I look for when buying?
7. What do they eat?
8. How can I sex them?
9. Can I breed them?
10. How many species are there?

ANSWERS.

1. *Corydoras pygmaeus* and *Corydoras hastatus* are the smallest described species, at twenty-five millimetres, with *Corydoras barbatus* possibly the largest at one hundred millimetres. (2PICS)

2. There are many ways of setting up tanks that are suitable for *Corydoras*; I think the main criteria would be what are the ingredients needed to create the ideal *Corydoras* environment. For me these would be: a) Tanks that are large enough to house the fish you intend to keep. (See answer 3). b) A smooth substrate to prevent damage to mouthparts. c) Quality water = Clean and aged for at least three

days, with near neutral values pH 6.8 – 7.4, GH10 – 15, and a temperature of between 70˚ – 76˚F would be a good starting place. Most water authorities supplies, although they may vary in values from one authority to another, are quite adequate for most species.

There are two types of set up that I use. The first is a community tank set up that is primarily aimed at housing *Corydoras*, in which other fish are added to give the tank a visual balance. External power filters are used on my community tanks because of the substrate I use, which is either fine smooth gravel no larger than one and a half millimetres, or well washed river sand which very quickly clogs under gravel filters. The depth of the substrate is quite shallow, no more than fifteen or sixteen millimetres deep, which allows the *Corydoras* to search out food particles right down to the base of the tank. This prevents the problem of food particles filtering deeper than the catfish can reach and souring the substrate.

For tank decoration, I use pieces of bogwood with either Java Fern or Java Moss attached. Although the substrate is fairly shallow, I have found most plants such as *Cabomba* and *Elodia* will and do grow well. Java Fern is particularly good because it can be attached to a variety of tank decorations, be it wood, slate or rocks. If it is held in place with the aid of an elastic band, it will attach itself in a very short space of time. It is a very tough plant and will grow well under a wide range of conditions.

The second type of set ups that I use are purely for breeding and raising fry. These tanks vary in size from 20cm x 20cm x 20cm which house small species, to 90cm x 45cm x 20cm which are stock / fry rearing tanks. The size of the tank for breeding is relatively unimportant, so long as it is large enough to house the fish that you are intending to breed. In the small 20 x 20 x 20cm tanks, I keep and breed small species like *C. xinguensis* and *C. griseus.*

All of my breeding and rearing tanks have a ten to fifteen millimetre layer of either river sand or fine smooth gravel in them. I have in the past and do still occasionally use tanks without any substrate at all; these are mainly for quarantining or raising delicate fry, where uneaten food and waste matter can be seen and removed easily with the minimum of disturbance to fish or fry concerned.

The types of filtration used in the small 20 x 20 x 20cm tanks are sponge filters. Box filters are used in the medium sized tanks (45 x 25 (30) x 25cm); in the larger 90 x 45 x 20cm stock / fry rearing tanks the filters are home made under gravel box types with power heads fitted. If I need extra filtration, I use an external canister type filter.

3. The number of *Corydoras* that can be housed in any one tank is much a matter of choice, but if you bear in mind that they are shoaling fish, they are generally happiest in groups of six or more.

My recommendation would be six to eight inches of fish to every square foot of base area. When calculating, do not count the caudal fin (tail) as part of the fishe's length; it's the body length that counts.

4. In the main, most of the *Corydoras* species that are available are quite hardy and not too difficult to keep and maintain in good health. Therefore the choice of species to start with will probably have more to do with finance than anything else. There are species such as *C. aeneus* and *C. paleatus* that have been in the hobby for many decades; these are being commercially bred in the thousands in far eastern fish farms and can be

bought for one or two pounds each, depending on their size. At the other end of the scale, there are species like *C. solox* and *C. pulcher* that have asking prices of thirty pounds or more each.

For those of you that have never kept *Corydoras*, I would recommend some of the less expensive species, which should be available for under a fiver each; some of them are quite striking in their markings and are ideal species to start with. Here are a few to look out for: *C. trilineatus* and *C. schwartzi* have sharp black and white markings. *C. metae*, *C. meleni*, and *C. rabauti* have tan coloured bodies with dark bands across the back. Then there's one of my all time favourites *C. arcuatus* (the skunk catfish), with its white body and arching black band that runs from snout to tail. Those of you looking to try your hand at breeding need look no further than *Corydoras aeneus*, its albino form, or *C. paleatus*; these are probably the easiest of all *Corydoras* to breed.

5. There are several sources to acquire *Corydoras* from; some of them are better than others. The first place to look is in your local aquatic shop. The choice of species there may be limited, but most if not all aquatic shops will have at least a couple of species on offer.

To find a larger choice of species, you may have to travel a little further afield to one of the shops that specialises in catfish. There are a few of these establishments around the country where the choice of species will seem almost endless. I have been known to make a round trip of over four hundred miles in a day because certain shops have got the species that I have been searching for.

A third source of supply is from someone that is breeding *Corydoras*. The biggest advantage with buying from a breeder is that you will know the conditions in which the fish have been bred and raised, how old they are and the best types of food to feed them. This last point is something that is almost impossible to determine with wild imported fish.

6. When buying *Corydoras*, there are a number of important things to look out for to ensure that you are selecting good quality stock. It is probably easier to list the fish to avoid and add the good points later: a) sunken eyes, b) red blotches in the abdomen, c) hollow belly, d) inflamed gills, e) missing or badly worn barbels, f) deformities. Fish that have sunken eyes are old and almost at the end of their lives. Those fish that are showing red blotches in the abdomen have an infection in the gut, which in most cases is fatal. These fish should be avoided and not given a second look because the chances are they will not survive for more than a few days. Fishes that have sunken or hollow bellies may survive given the right kind of conditions and feeding. I would still leave these fish alone. Reddened / inflamed gills are also a sign of infection which may or may not be easily cured. If the fish was rare and the price was right, then I might take a chance, but normally I would leave these fish alone.

The barbels of *Corydoras* are very important sensory organs used for detecting and searching out particles of food from the substrate, and, where the females are concerned, play a major part in the breeding activity. Badly worn barbels may result in infection and mouth fungus, so again these are fish that I would avoid. Any fish that are showing deformities are definitely given a miss; although they may be perfectly healthy, they may pass on their deformities to their offspring.

Freshly imported fish quite often arrive with damaged finage, splits or with pieces missing out of them. In most cases, the damage will grow out and is not normally a danger to the fish's health.

Now that we've seen the

undesirable fishes what does a good one look like I hear you ask. Well a quality *Corydoras* should have a full rounded body, sparkling eyes, good barbels, a full set of seven fins; the flanks and gill covers should be covered by a metallic sheen. Finally it should be reasonably active, although there are some species which are far more active than others.


Corydoras pulcher

7. The choice of food is very important with any fish you keep and not just *Corydoras*. I use a variety of foods both commercially manufactured, as well as cultured and collected live foods. My feeding program is based around a staple diet of either a pre-soaked (so it sinks to the bottom straight away) quality flake or sinking tablet food. The tablets are crushed before giving to the smaller species and crushed powder fine for fry.

Live foods come in a variety of forms. The following are the ones that I mainly use: non- aquatic Micro Worm, White Worm and earthworm finely chopped, Aquatic Brine Shrimp, Daphnia, Tubifex and Bloodworm. All live foods are given in small amounts, that is to say, as much as the fish will eat in five or ten minutes.


Corydoras rabauti

There are also frozen foods that are very good especially during the winter months when live foods can be harder to come by. The range of frozen foods is quite extensive from Cyclops to mussels and these days most aquatic shops stock them. It doesn't hurt to try these out now and again; I've not found any that my fish won't eat, although some may need grating down to a size that can be consumed easily.

During the summer when Daphnia is plentiful, I will collect as much as I can, drain off the water when I get home and freeze it in plastic bags. I roll it out flat so that it is in sheets of about the same thickness as a medium slice of bread, (10mm thick). This makes it is easier to break pieces off to feed to the fish, and each bag contains enough Daphnia to feed all my fish.

Feeding takes place twice daily whenever possible. When time permits, the morning feeds will consist of flake (pre-soaked) or tablet foods only. In the evening the tanks that are scheduled for water changes have this done first. Then the fish are fed; however, all the fry tanks have daily water changes before feeding commences.

8. Sexing *Corydoras* is not always the easiest thing to accomplish, especially with freshly imported fishes, so I will explain how I go about the task. To start with, there are three areas where I look for differences. The first is color, which is probably the easiest area where differences will show. With most *Corydoras* species, there are no discernible color differences, but in those that do show color dimorphism, it's the male that poses the brighter, more intense color patterns. There is, however, a danger here because with some of these species, the color differences are so great you could quite easily think that you are looking at two separate species.

The first thing to do is ask the retailer if they have been brought in as the same species; if they were, then there's a fair chance that they are the same species. I would then take two of the brighter colored specimens to every one of the lesser-colored ones. If there is any doubt, then I would take equal numbers of each. Most *Corydoras* species belonging to the 'elegans' group do show color dimorphism.

The second area I look at is the finage. Mature male *Corydoras* almost always have longer and more robust fin spines than females, in particular the pectoral fins and, to a lesser extent, the dorsal fin. With some species, the differences are so small that it is virtually impossible to see. With other species, the differences are quite dramatic to the point where the males' fins can be twice the length of the females. When there are no discernible differences visible in the Dorsal or Pectoral fins, the area I look at next is the Ventral

fins. If there are any fin differences to be seen at all, it will be here with males having longer, narrower and more fine.

The third and final area that I look at is the body. When viewed from above, the widest part of the females' body is at a point just forward of the insertion of the ventral fins. In males, the widest part of the body is at or just behind the insertion of the pectoral fins. When viewed from the side, females show a deeper, more rounded body shape, where males should look slender and far more streamlined. There are other characteristics that can also help to differentiate the sexes. For instance, *C. barbatus* males have bristles on the cheeks and females don't. So with species that are difficult, I will look for anything that can separate them. On the occasions when I find it impossible to separate the sexes, I will buy at least six specimens or more if the price is right. Once you have had the fish for a while and conditioned them, the sexes will be relatively easy to separate.

9. Breeding *Corydoras* in itself is not difficult the fish do that with relative ease all on their own. The difficult part is triggering them to do so in the first place. There are many conditions that need to be met before they will breed. Sometimes all that is required is a change of water of the same temperature to set them off (*C. pygmaeus*). The next stage would be a change of water that is slightly cooler. Fve or six degrees Fahrenheit is enough to promote spawning interest. *C. aeneus*, *C. paleatus* and *C. panda* are typical of the species that will respond to the cold water treatment. Once the basic water change methods have been tried, then things start to get a little more difficult and other methods need to be used. What I do when trying to encourage a species to spawn is only try one thing at a time. This is because the first thing you changed may have been the right trigger. The second change may counteract the first and put the fish off spawning altogether. This may sound a bit like basic common sense to many of you, but it is surprising how many people tell me all the things that they have done to try to trigger their *Corydoras* to spawn. When asked, they tell me several condition changes were made at the same time.

I would also recommend keeping notes as, in my opinion, they are invaluable, especially when trying to breed some of the more difficult species. These notes can be referred to at any time to see the changes that have been made, or used to help formulate a series of changes that you think may trigger a spawning. The following is a list of the things that I would do in order to encourage a species to spawn, given that the fish are in spawning condition; a) A weekly water change with no temperature change. b) Twice weekly water changes with no temperature change. c) Daily water changes with no temperature change. Then a, b, and c, again this time reducing the temperature by six to eight degrees Fahrenheit. After the cooler water changes, the same sequence would be applied using warmer water again by six to eight degrees Fahrenheit. There are some species of *Corydoras* that prefer warmer temperatures; *C. gossei* is one of these. I will change the same amount of water approximately fifty percent for every water change made to maintain consistency. My next move would be to extend the time between water changes from one week to two weeks and then three or even longer, first with equal temperature water, then with cooler water. If all these measures failed, then I may try reducing or raising pH values, then the general hardness lowered or raised. A list of things that could trigger a spawning is endless as is the time needed to implement them, so I would say the main ingredient to successful *Corydoras* breeding is patience and lots of it.

10. The number of described *Corydoras* species is now around one hundred and forty with many more species as yet undescribed and arriving in aquatic shops all over the country almost weekly.

Because there is a lot of confusion in the true identification of many species, especially those that look similar to each other. *C. metae, C. melini* and *C. davidsandsi* are one example. *C. amapaensis*, *C. septentrionalis,* and *C. simulatus* are another. With these and many other species where there are colour pattern similarities, I will in future articles try to demonstrate ways of how to differentiate between these and other species.

Robert Paul Hudson
from Robert's web site in Salem, Oregon: Aquabotanic.com
Aquarticles

Substrate & Fertilization
INTRODUCTION

Plants need a balance of macronutrients (those they use the most of), and minor or trace nutrients (which they use to a lesser degree).

Macronutrients:
Nutrients used by plants in relatively large amounts. They are nitrogen (N), phosphorus (P), sulfur (S), calcium (Ca), magnesium (Mg) and potassium (K).

Micronutrients:
Nutrients used by plants in small amounts. They are iron (Fe), manganese (Mn), copper (Cu), zinc (Zn), molybdenum (Mo), cobalt (Co), and boron (B).

The Substrate is the growing medium that the plants are rooted in. It is important to add a source of these nutrients to the substrate, particularly in a new aquarium that has no mulm or fish waste settled in it yet.

It is also advisable to use a medium such as porous gravel that will provide a good CEC and not compact together. CEC (Cation Exchange Capacity) is the ability of the medium to absorb cation ions, (minerals from fertilizers) and hold them making them accessible to the plants when the plants need them. Sand and coated gravel do not provide a good CEC. Good CEC mediums include porous gravel, clay litter, and clay soils. Macronutrients include nitrogen, oxygen, CO_2, potassium, phosphorus, calcium. Minor elements include iron, boron, zinc, manganese, and other trace minerals. Iron is an important element for many plants and is often added to the substrate with other minerals.

Laterite is a sediment soil that is formed in nature by decaying rocks which are high in iron and aluminum. There are a few aquarium products made of laterite, such as Duplarit, and First Layer. Other sources of iron are soils, clay litter, red pottery clay, and sphagnum peat.

Various substrate methods:
- Layered substrate with "sub" soil (soil low in organics), sphagnum peat, gravel, and trace element mix.
- Pottery clay balls enhanced with trace elements, or commercial additives made for the aquarium
- Clay gravel
- Granular laterite, sphagnum peat, and gravel. My mix of choice.

Fail-safe beginner substrates:
Commercial products, laterite, clay gravel, clay based additives made for the aquarium

NPK What are those three numbers?

Nitrogen supplied by the fish, phosphates by the water supply and uneaten food, and potassium to a lesser degree in the water supply. NPK fertilizers should only be added if you have low or unreadable levels already. RO, distilled, and some bottled spring water will be low in NPK and mineral elements. Most tap water will have sufficient levels of P. Even some aquarium products contain NPK. An NPK fertilizer high in potassium, but low or 0 in nitrate and phosphate has the least affect on algae. Check the numbers. Single digits are low, double digits are high. In a heavily planted tank with fast growing plants, and a small number of fish, it is possible to have consistent 0 readings of nitrate and phosphate creating a nitrogen and phosphate deficiency for the plants.

Nitrogen supplied by the fish, phosphates by the water supply and uneaten food, and potassium to a lesser degree in the water supply. NPK fertilizers should only be added if you have low or unreadable levels already.

Target nutrient ranges:

Nitrate (N03) 5 to 10ppm
Phosphate (PO4) 0.2ppm to 0.5ppm
Iron (Fe) 0.2 to 0.7ppm
Potassium (K) 20-30ppm

Types of fertilizers:

- tablets
- spikes
- balls
- liquid

Sources of trace elements:

- Sphagnum Peat: Iron (Fe). High CEC
- Soils: Iron (Fe) other trace elements. High CEC
- Pottery clay: Iron, (Fe). High CEC
- Clay litter: Iron, (Fe). High CEC
- Vermiculite: trace amounts Iron, Potassium, Magnesium. Very High CEC

Drawbacks of Soil substrates:

When plants are removed or replanted, the soil mixture can come up with the plants and pollute the water. You are better off using a clay gravel if you anticipate moving and transplanting plants often.

The Following information is taken from "Something to Grow on", Cornell University. It is not written specifically for aquariums, but the information is very useful. I particularly like the information on CEC:

Ions Cation exchange capacity (CEC) quantifies the ability of media to provide a nutrient reserve for plant uptake. It is the sum of exchangeable cations, or positively charged ions, media can adsorb per unit weight or volume.

It is usually measured in milligram equivalents per 100 g or 100 cm3 (meq/100 g or meq/100 cm3, respectively). A high CEC value characterizes media with a high nutrient-holding capacity that can retain nutrients for plant uptake between applications of fertilizer. Media characterized by a high CEC retains nutrients from leaching during irrigation. In addition, a high CEC provides a buffer from abrupt fluctuations in media salinity and pH.

Important cations in the cation exchange complex in order of adsorption strength include calcium (Ca_2+) > magnesium (Mg_2+) > potassium (K+) > ammonium (NH_4+), and sodium (Na+). Micronutrients which also are adsorbed to media particles include iron (Fe_2+ and Fe_3+), manganese (Mn_2+), zinc (Zn_2+), and copper (Cu_2+). The cations bind loosely to negatively charged sites on media particles until they are released into the liquid phase of the media. Once they are released into the media solution, cations are absorbed by plant roots or exchanged for other cations held on the media particles.

Anion exchange capacity: Some media retains small quantities of anions, negatively charged ions, in addition to cations. However, anion exchange capacities are usually negligible, allowing anions such as nitrate (NO_3-), chloride (Cl-), sulphate (SO_4-), and phosphate (H_2PO_4-) to leach from the media.

Cation Exchange Capacities for various growing media amendments and selected media.

Material/Cation Exchange Capacity meq/100g
Perlite/ 1.5 - 3.5
Silt/ 3.0 - 7.0
Clays/ 22.0 - 63.0
Pine Bark/ 53.0

Vermiculite / 82.0 - 150.0
Sphagnum Peat / 100.0 - 180.0
Humus / 200.0
Peat moss : vermiculite 1:1 / 141.0
Peat moss : sand 1:1 / 8.0
Peat moss : perlite 1:3 / 11.0
Peat moss : perlite 2:1 / 24.0
Sources: see Bunt, A.C. 1988, and Landis, T. D. 1990.

Sphagnum peat moss

Sphagnum peat moss, derived from the genus Sphagnum, contains at least 90% organic matter on a dry weight basis. In addition, this peat moss contains a minimum of 75% Sphagnum fiber, consisting of recognizable cells of leaves and stems.

Approximately 25 species of Sphagnum exist in Alberta, Canada and 335 species are present throughout the world. Sphagnum fuscum is an important species bearing many desirable traits. Sphagnum grows in northern cool regions and is also located in peat bogs found in Washington, Maine, Minnesota, and Michigan.

Many pores are present in the leaves of sphagnum; when used as growing media, as much as 93% of the water occupying this internal pore space is available for plant uptake (Peck, 1984). After draining, sphagnum peat can hold 59% water and 25% air by volume.

Sphagnum is usually characterized by an acidic pH, low soluble salts content, structural integrity, and the ability to serve as a nutrient reserve (*Landis, 1990*).

Although peat mosses are classified into four different groups, variation may exist within any one type of peat moss. Peats of the same classification often differ notably in quality, and even peats from the same bog taken from separate layers can possess different chemical and physical properties.

Sphagnum peat moss is classified as light or dark peat, based on its color. Light peats are characterized by a large amount of internal pore space, 15 - 40% of the pore space comprises aeration porosity. Dark sphagnum peat does not display the elasticity of light peat and is usually not as long lasting. Dark sphagnum peat moss maintains twice the cation exchange capacity of light peats, yet does not possess as much total or aeration porosity.

Inorganic media

Materials such as vermiculite, perlite, and sand represent the inorganic fraction often used in container media formulations. These materials generally increase the aeration porosity and drainage yet decrease the water-holding porosity of media. Inorganic components are usually inert materials characterized by a low cation exchange capacity.

Vermiculite

Vermiculite is a commonly used inorganic media component which is mined in the U.S. and Africa. This mineral, comprised of an aluminum / iron / magnesium / silicate mixture, is excavated as a material composed of thin layers. Processing includes heating the vermiculite to temperatures upwards of 1000˚ degrees C, which converts water trapped between the layers of the material into steam. The production of steam results in a pressure that expands the material, increasing the volume of the pieces 15 to 20 times their original size.

Vermiculite is sterile because of these high heating temperatures used during processing. Vermiculite is characterized by a high water-holding capacity as a result of its large surface area: volume ratio, a low bulk density, nearly neutral pH, and a high cation exchange capacity attributed to its structure. Because it compacts readily when combined with heavier materials, vermiculite is sometimes recommended more for propagating material than container media.

Vermiculite gradually releases nutrients for plant absorption; on average it contains 5 - 8% available potassium and 9 -12% magnesium. This inorganic media component can adsorb phosphate - some of which remains in an available form for plant uptake, but cannot absorb nitrate, chloride, or sulfate. Vermiculite can fix ammonium into a form that is not readily available for plant absorption. This fixed nitrogen is gradually transformed to nitrate by micro-organisms, making it available for plant uptake.

Vermiculite is manufactured in four different grades, differentiated by particle size. Insulation grade vermiculite and that which is marketed for poultry litter (which has not been treated with water repellents) has been used with some success.

Vermiculite which has been treated with water repellent, such as block fill should not be used as growing media. Because vermiculite tends to compact over time, it should be incorporated with other materials such as peat or perlite to maintain sufficient porosity. It should not be used in conjunction with sand or as the sole media component, because as the internal structure of vermiculite deteriorates, air porosity and drainage decreases (*Landis, 1990*). The particle size of vermiculite influences the water-holding and aeration porosity of the material. Although grade classification is based upon particle size, each grade is represented by a range of particle sizes. Note that grades consisting of larger particle sizes have a higher aeration porosity and lower water-holding porosity than grades consisting of a smaller range of particle sizes. Properties of the four vermiculite grades are shown in an associated table.

Perlite

Volcanic derivation, perlite is a second inorganic component which may be used in formulating container mixes. This chemically inert material is extracted in New Zealand, the U.S., and other countries and is usually mined by scraping the earth's surface. The processing method includes a grinding and heat treatment (up to 1000 degrees C) which results in very lightweight, white sterile fragments. As the ore is heated, internal water escapes as steam, resulting in the expansion of the material.

Perlite has a very low cation exchange capacity, low water-holding capacity (19%), and neutral pH. The closed-cell composition of perlite contributes to its compaction resistance, enhances media drainage, and heightens the aeration porosity of peat-based media (*Bilderback 1982*). Because perlite contains only minute amounts of plant nutrients, liquid feeding is a practical mode of fertilization. Be aware of possible aluminum toxicity in acidic media (pH 5).

The very low levels of fluoride perlite contains is not likely to pose plant health problems. Any soluble fluoride present in a media characterized by 6.0 - 6.5 pH will precipitate out of the media with excess calcium from sources such as gypsum, limestone, or calcium nitrate.

Although perlite has several positive attributes, it also has drawbacks. Perlite consists of many fine fragments which, when dry, can lead to lung or eye irritation. In addition, because water clings to the surface of perlite, it may tend to float in the presence of water (*Landis, 1990*).

Perlite contains, on average, 47.5% oxygen, 33.8% silicon, 7.2% aluminum, 3.5% potassium, 3.4% sodium, 3.0% bound water, 0.6% iron and calcium, and 0.2% magnesium and trace elements (*Perlite Institute, 1983*). Although a uniform categorization of perlite does not exist, individual producers of this inorganic component assign grade levels. This inorganic media amendment is sometimes recommended for use only in propagation media because of its low bulk density and tendency to compact.

In comparison with sand, polystyrene, or pumice, perlite has the greatest inner total porosity. Coarse perlite is characterized by approximately 70% total porosity, 60% of which is aeration porosity. Perlite can retain two to four times its dry weight in water, which is much greater than that of sand and polystyrene, yet much less than the water-holding capacity of peat and vermiculite (*Moore, 1987*).

Sand

Sand has been used as an inorganic media component to add ballast to containers. Some sands contain calcium carbonate which may raise media pH undesirably. A rise in pH may lead to nutrient deficiencies, particularly of minor elements

such as iron and boron. A few drops of dilute hydrochloric acid or strong vinegar may be added to sand to test for carbonates; if bubbling and fizzing result, carbonate is present as a result of carbon dioxide production.

Sand used for container media should have a 6 to 7 pH. Sand maintains good drainage, a low water-holding capacity, and a high bulk density when used independently of other materials. Because of its shape and size, sand can obstruct pore spaces, decreasing drainage and aeration, instead of improving porosity.

Various sand particle sizes have been recommended for container media use, including ranges of 2-3 mm or 0.05 - 0.5 mm (fine sand) in size (*Landis, 1990*). In addition, another recommendation suggests that 60% of the particles be within 0.25-1.0 mm range, and 97% be greater than 0.1 mm and less than 2 mm (*Swanson, 1989*). Uniformity coefficients assigned to sand mixtures signify the amount of sand which is within a certain size range; a coefficient < 4 is evidence of a homogeneous sand mixture (*Swanson, 1989*). If the correct grade of sand is used, the wet ability of the media is enhanced.

Calcined clays

When fired at high temperatures, some clays, fuel ash, and shales form stable compounds that possess low bulk densities and internal porosities of 40-50%. Though calcined clays alter the physical attributes of media in a positive way, they also decrease the level of water-soluble phosphorus in the mix.

Because calcined clays are characterized by a high cation exchange capacity, fertilizer application rates may need to be modified if calcined aggregates are incorporated into the media mixes (*Bunt, 1988*).

Pumice

Pumice is produced as volcanic lava cools; escaping steam and gas contribute to its porous nature. This alumino-silicate material contains potassium, sodium, magnesium, calcium, and slight amounts of iron. Pumice can absorb K, Mg, P, and Ca from the soil solution and render it available for plant absorption later (*Bunt, 1988*).

Have questions?
Email me at robert@aquabotanic.com

Anthony Kroeger - BAS

TETRAS & TOUGHIES

How to mix Tetras and Cichlids

WHAT!!

SOME IDEAS TO TRY

Most people when they think of tetras, think of cardinals and neons, and when they think of mixing cichlids with them, they think of rams. But in nature, many tetras live in the same waterways as cichlids. True cichlids eat many tetras, but many tetras get along surprisingly well with cichlids.

Tetras come from South America, Central America and Africa, pretty much the same as cichlids, except for Madagascar and the Indian subcontinent.

Tetras are *characins*. They have teeth and know how to use them. Boiling, churning water filled with piranhas as seen in cheap B-grade movies comes to mind.

Piranhas are *characins* as are neons and they all have teeth. Also most tetras are fast; their streamlined bodies are made to move quickly thru the water. So many tetras are well matched to handle what a cichlid can throw at them.

This article explores some unusual combinations of tetras and cichlids which have worked well for me. I'd like to hear other aquarists' opinions on these combinations. If you try them, write me care of BAS and let me know your results.

1

Malawi *Melanochromis* and/or *Pseudotropheus* species and *Exodon paradoxie* - I have found *Exodons* are a wonderful dither fish for the above species. Always active, fast and somewhat aggressive, they have no problems holding their own with these cichlids. Fast enough to get their share of food, they are colorful

as well. I have used single *Exodons* and small schools of 5 to 6 fish. Never use only two *Exodons*. You will soon have only one due to the *Exodon* bullyng each other.

2

Any *Distichodus* species and Lake Victoria *Haplochromis* species. The reasons and care results are the same as #1.

3

Anostomus anostomus and Jack Dempseys - this odd combination I stumbled across by accident. I had an *Anostomus* jump from its tank into a tank of Dempseys. Instead of being killed, it became more active and the Dempseys' color and deportment were much improved. Again, this works with schools of 4 to 6 *Anostomus* also. The *Anostomus* nip and bother each other much less if they have Dempseys to keep an eye on. Try this combination; it's awesome.

4

Redtail *Chalceus* and any *Paraneetroplus* species (ex black belt cichlids) both get large and colorful. As long as their sizes are similar, the *Chalceus* make excellent dithers for the cichlids. They are fast and can easily hold their own.

5

Black neons and *Festivums* - this is one of my favorite combinations. Yes, you may occasionally lose a black neon to a large *Festivum*, but this is rare. Usually both get along just fine, and I find the contrasting stripes on the neons and the *Festivums* to be interesting artistically. It's sort of like a Picasso in a tank!

6

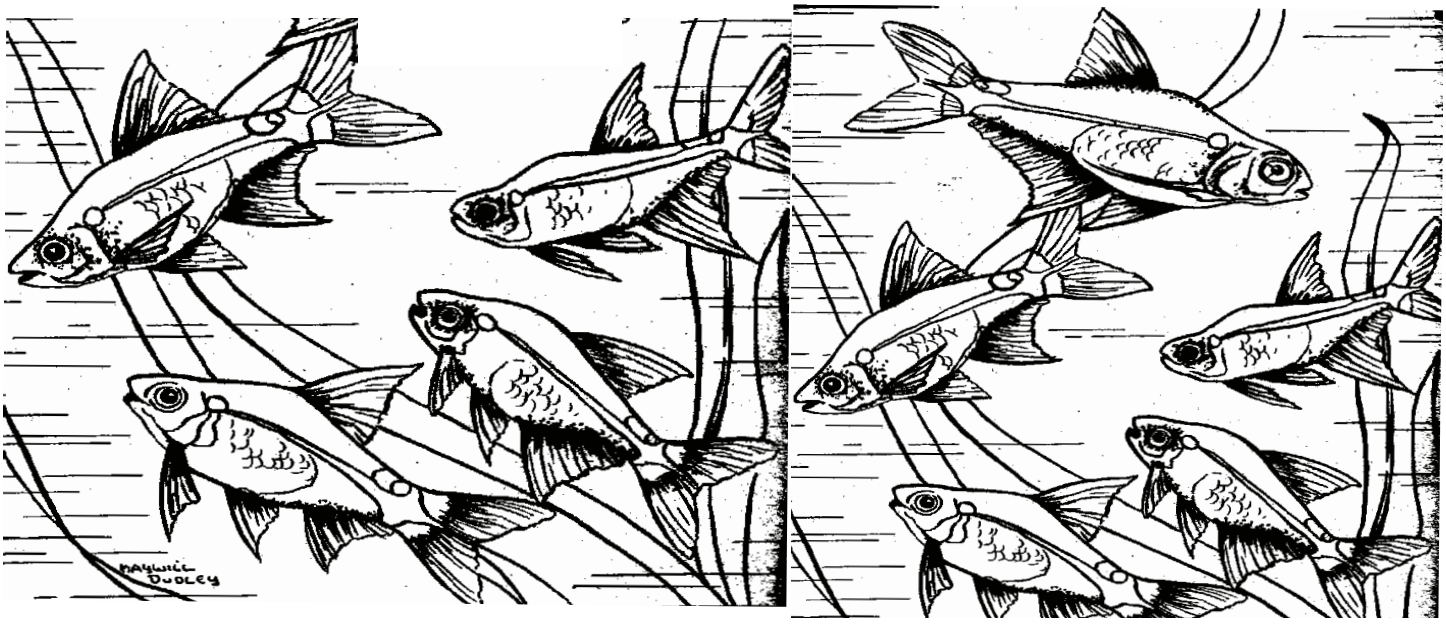
Blind cave tetras and firemouths - this is the most unusual and interesting combination I have found yet. In nature, firemouths and *Astyanax* occur together, but not the blind cave form. The interaction fo these two fish is amazing!

The blind cave fish sense (smell?) the cichlids. Their reaction is to form a revolving school around the cichlids' territory. At feeding time, the school makes lightning fast forays thru the cichlids' territory to grab morsels of food. Try this combination just to watch the behavioral interactions.

So the next time you want to keep something interesting with your cichlids...think tetras.

Happy Fishkeeping.

Tony



The Cuban Cichlid

Nandropsis tetracanthus

The Cuban Cichlid, *Nandropsis tetracanthus*, is one of the few insular *Amphilophines*, residing in Cuban rivers and lakes that are densely vegetated. It is not well known in the hobby for political reasons, making importation difficult.

It is sometimes confused with the Jaguar Cichlid, but the Cuban has a ground color of white with grey-black splotches and in males an iridescent purple sheen to the front of the head. It is a stouter fish than the Jaguar. It is sexually dimorphic, but hard to sex. Males reach 12 inches, females 10. There is no hump in either sex.

Females often have a large dark blotch on the front of the dorsal fin. The dorsal is fairly rounded in both sexes. There are 2 nominal strains: the ssp1 with bolder and larger black facial blotches, and the ssp2 which has finer smaller dark spots and more white area. It is a bottom to middle swimmer, and in the wild eats insects, worms and small fish. It is considered a very vicious fish by people who have kept wild caught specimens, but tank raised ones do not become conspecifically very aggressive until about 4 inches in length, and thereafter are semi-aggressive with other large Central American Cichlids and catfish. (I have kept one with a large *Distichodus* without incident.) It is a reclusive fish, which usually lives in a rock or shoreline cave when not mating or eating.

It makes a good captive, and needs at least a 50 gallon tank as an adult. The tank should have a substantial swimming area, and hide rocks or a cave. They dig a fair amount. Curiously, it will destroy all rooted plants in a tank, as it is very tuned in to its line of sight. In captivity, they eat all standard meaty foods, shrimp, and large pellets. They are substrate breeders, but since they are hard to sex, the best way to get a pair is to raise several small ones. They will pair off once they exceed 4 inches. They are good parents and care for their fry up to an inch in length. The young are fairly fragile until the 4 inch stage when their hormones come in. They should be kept at pH 7 - 8 and 75˚F to 85˚F degrees, in moderately hard water. They are messy and need strong filtration.

Vieja syspilum

Cuban Cichlids do crossbreed with Jaguars in captivity, and there are reports of it having been hybridized with *Vieja syspilum*. Since the latter is a component of Flowerhorn genetics, there is speculation that the pearling and fine spots on some Kamfa Flowerhorns may in part be inherited from the Cuban Cichlid.

John Todaro – BAS

SPECIES PROFILE

Scientific Name: *Nandopsis tetracanthus.*
Common Name: Cuban Cichlid, Biajaca.
Family: *Cichlidae.*
Origin: South Cuba.
Distribution: Found - rivers and lakes.
pH Range: 7 - 8.
Temperature Range: 75˚ - 86˚F.
Ideal Hardness: Moderate hardness.
Life Span: 3 - 5 years.
Size: 10" inches.
Temperament: Highly Aggressive.
Diet: Carnivore. Will eat flakes and pellets of all types, also live or frozen foods. It is important to add some vegetable contribution to their diet, some fruit (apple, banana, peach) piece, provide at least 3 or 4 times a month; small fishes, crustaceans or worms, it accepts insects like crickets, flies, etc.
Sexing: Males are bigger than the females, and have a larger dorsal and an anal fin more pointed than females. The females have a more delicate coloration.
Breeding: Cuban cichlids are relatively easy to breed once a pair has been established. The best way to get a pair is to let a group of young fish grow up together and form pairs. Once pairs have formed, you remove the excess fish from the tank. The eggs are laid on a flat surface and the fry can be fed newly hatched brine shrimp. The parents will protect their fry until they start getting ready to spawn again. Cuban cichlid fry grow quickly. Eggs hatch in 5 days and wigglers are moved to pre-dug pits. Fry are free swimming in 7 more days. Feed baby brine shrimp and daphnia.
Remarks: Keep Cuban cichlids in at least a 55 gallon tank. Decorate with large rocks, driftwood. Create hiding places large enough for this fish while leaving areas open for swimming. Only use floating plants and hardy plants such as Java fern; other plants will be destroyed. Plants are not necessary but recommended. It's important to decorate the aquarium so natural territorial boundaries are formed. The aquarium should be well filtered. The Cuban cichlid produces large amounts of waste.
Reference:
cichlid-forum.com
cubanaturaleza.org
aquaticaccommunity.com
petworldrochester.com/cichlid

Anthony P. Kroeger – BAS

TOO TOUGH TO KILL

Marine Fish for Beginner Marine Aquarists

#2 TOUGH

The Sergent Major

Abudefduf saxatilis

We continue our survey of beginner fish that will handle any mistakes thrown at them and still survive.

My #1 choice in Damsels is the Sergent Major. In my opinion, this is the hardiest Damsel.

Most Sergent Majors in stores come from Florida or the Caribbean. They can grow to about 5" inches, but usually remain smaller. Majors have a silverly /yellow body with 5 vertical black stripes over it; the tail is a smoky black. Young fish are especially yellow.

Majors eat any food offered. Once I fed them cracker crumbs just to see if they'd eat them. They loved them!

Any normal water at pH 8.0, a temperature between 72° - 80°F, a salinity between 1.020 and 1.024 will suit them fine. A 20 gallon or larger tank will be just fine. I use Majors to cycle tanks because they turn black when their water quality goes bad. If this happens during cycling, change 20% of the water and they will recover.

They behave like Tomato Clowns when cycling a tank. Majors also do fine alone, or you can keep them in schools. But a school is basically a collection of Ebenezer Scrooges all in one room.

They are grouchy with each other but still tolerate the company.

Majors tolerate wide temperature fluctuations. I once had a heater thermostat stick, the tank temperature went to 103°F and the Majors were the only fish to survive.

Although breeding habits of this damsel are known, it is not raised commercially.

All specimens available in stores are wild caught. Juveniles of this fish will sometimes exhibit "cleaning" behavior. That is, they will pick parasites off other fishes. This is not a common behavior with this fish, but I have seen it on occasion. So if you see them pick something off another species of fish don't worry.

However, if the behavior is constant, badgering, belligerent or chasing, that in nature is not a "cleaning" behavior, that is aggression and must be dealt with.

This fish is not the cheapest damsel to buy, but compared to other fish, it is usually cheaper.

Majors are also good "dither" fish for shy fish. Majors constantly swimming and move about the aquarium. They're bold feeders that are always first to the chow line. A Major that hides is stressed, in trouble and this indicates that something is wrong.

Because of their constant (dither) activity, they help fish that can be shy to feel more comfortable and safe, If it's safe for the Majors to be out in the open, then it's safe for the shy fish too.

Majors' boldness at feeding time also helps other fish feed better too.

Do not keep 2 Majors together. One will bully the other. Always keep Majors either lone or in schools of 3 to 6 fish.

Bar none, this is the toughest Damsel I know of. This fish has earned its stripes as a beginner's fish. Try some next time you set up or cycle a marine tank.

Until next time and toughie #3, a fish with lots of color.

Tony

WHEN THINGS GO WRONG . . . NOTHING GOES WIGHT!

The other day I was thumbing through a Brooklyn Aquarium Society archive issue of the *Aquarium Bulletin* from September 1917 and came across an article by one of the founding members of the Society, **Herman Rabenau**, and an importer of tropical fish. Among his many achievements, he must be credited with being among the first persons to import Angelfish to the States.

In this article, he recounts a collecting trip he undertook to North Carolina for the Society in which just about everything went wrong and he found himself in jail. Reading between the lines, you'll see the sarcastic nature of this article about his ill fated adventure.

John Todaro, Ed

September THE AQUARIUM BULLETIN 1917

Collecting Fish Under Difficulties

By Herman Rabenau

(Mr. Rabenau recently made his second excursion in the interest of the Brooklyn Aquarium Society, Inc., for the collection of Southern Wildfish to be used in the scientific study of the Society.)

Once a man gets the "Aquarium Fever", he generally lets his enthusiasm carry him further than he originally intended and at times unpleasant experiences result.

Having made one very successful trip in the interest of The Brooklyn Aquarium Society, Inc., for the collection of specimens of wildfish from Southern waters for their use in scientific study and exhibitions, I was naturally elated to receive another assignment. I concluded to go in the cool Spring and take in North Carolina.

Because of the concentration of varied geographical conditions at the upper headwaters of the different streams, and the consequent variety in species, I decided to make a round trip that would embrace as much territory as possible.

Going first to the upper branches of the Santee River in North Carolina, I found mostly sandy river beds. These branches are fed by cool springs; after each rain clay sediment with which the country is overlaid, the rocky formation being from four to ten feet beneath.

Following up a branch of the Santee River, the Catawab, great changes were found, new bridges having replaced those washed away by floods. The smaller tributaries were clear and shallow.

Inquiring of a small boy if there were minnows in the brook, I was told that the druggist was selling them at ten cents each but I was disappointed to find that the fish were common goldfish, *Carassius auratus*. However, the druggist, a Mr. Davis, proved of great assistance by granting me storage space for my paraphernalia.

During the next few days I became acquainted with the nearby brooks, but found specimens scarce, most of the fish having been swept away during the floods.

As warmer weather approached, however, specimens became slighty more plentiful and I filled one can with them and expressed it to Brooklyn, preserving in alcohol one of each class.

Never having seen a person collecting fish in this manner before, the natives viewed

me with astonishment and apprehension and finally verified my statements by communicating with the New York authorities. My next blow was advice that my fish had died enroute to New York, the reason for which later proved to be the unsuspected presence of wood alcohol, instead of grain alcohol, in the coating of the can used.

Next going beyond Asheville, N.C. to a point some 6000 feet above sea level, I learned of an aquarist, a Dr. Von Rok, a philanthropist who maintains a beautiful conservatory with pools, aquatic plants and goldfish. In this territory I found only Blacknosed Dace and a variety of Sculpins, *Cattus ictalops.*

I next left for Shausville where I had collected on my previous trip. I was here received by a Mr. Taylor who lent me every aid. In this vicinity were small ditches inhabited by minnows from sholes from which I collected fine, hardy specimens of *Crosum oreas* and *Notropus cerasinus*. The water, which found its source in a small spring, was nearly still. The following day I took a wagon with my cans and a helper and in two hours had the cans, each 20 inches in diameter, filled with some 500 selected specimens.

My elation was short-lived, however; a game warden. to whom complaint had been made, approached and I was placed under arrest for game fishing without a license. My documents, proving that my efforts were strictly for scientific purposes, were disregarded and a local Justice of the Peace fined me $70. Not having this sum at the moment, I was placed in confinement, being taken ten miles by automobile to the county seat. Strange to say, these good-hearted people did not add a charge for this unsolicited ride.

The following day I was visited by more county officials who pleasantly informed me that the Justice had erred in his fine and that it had been increased to $200 instead. It now dawned upon me that my cans, etc., had excited more than ordinary attention and that I was suspected of being an anarchist or worse.

After paying my fine under protest, I wired to Dr. Smith of Washington, D.C., Commissioner of Fishes and president of the Washington Aquarium Society, who courteously intervened in my favor.

The protest against the fine and confiscation will be appealed and decided in a few months and, as the District Attorney doubts the legality of the action taken, there is every probability of a proper refund being made.

Anxious about my specimens, I hurried to the railway station and found they had received no care, the water being black and only some twelve fishes were still living.

My next stop was at Washington where I visited the Aquarium and left bottled specimens for classification, which was made as follows:

Minnows: *Hyopsos ketuckiensis, Rhinichthys atronasus, Notropis ombratilis ardens, N. cerasinus, N. hudsonius, N. macdonaldi, N. procne, N. pyrrhomelas, N. chalybacus, Chrosomus areas, Leuciseus vandoisulus* and an unknown specimen.

Suckers: *Catostomus commersonii.*

Darters: *Etheostoma flabellare, E. thalassinum* and three unknown specimens.

Sculpins: *Cottus ictalops.*

Madtoms: *Schilbeodes insignis.*

Note: Owing to these conditions, it was impossible to procure any photographs as was planned. - Ed.

Anthony P. Kroeger – BAS

TOO TOUGH TO KILL

#1 tough

Invertebrate for Beginners

CORAL BANDED SHRIMP

Stenopus hispidus

We've covered fish so far, but what about cool critters? Well, that's inverts and the focus of this series onward we first go to meet the Coral banded shrimp. This is one beautiful, hardy shrimp. A red and white candy cane striped body and claws with huge white antennae make this shrimp a real eye catcher.

Most specimens sold in the trade are collected in Florida. This hearty shrimp stays relatively small, at several inches in length, but its beautiful white antennae can easily double that length.

I keep mine at 1.022 -1.025 salinity and at 8.0 - 8.2 pH and at a temperature range of 72˚F to 80˚F at the most. They tolerate new tank cycling. Coral Bands eat any flake, pellet or frozen food offered. They are not picky. They are active enthusiastic feeders, often leaping up off of the substrate to grab at sinking flakes with their claws. When not grabbing at food, they constantly poke in the substrate with their claws looking for a choice morsel to eat.

Coral Bands also are occasional cleaners. This is a very interesting behavior. Cleaners are called such because they will climb up on a coral and set up a "cleaning station" where they will pick parasites off of passing fish. Coral Bands will "clean" a fish's body, fins, mouth pretty much the whole fish.

This unique behavior is called mutualism. Both animals benefit. The fish loses its parasites and is kept healthier. The shrimp gets a meal by eating the parasites. Watch for "cleaning" behavior and you will see nature at its finest.

Coral Bands are active all day. They sleep at night and Coral Bands are peaceful with all fish (that do not eat them) and other inverts, but not with each other. Never put more than one Coral Band in an aquarium unless you are fortunate enough to buy a breeding pair. A breeding pair usually will get along fine.

Coral Bands grow by shedding their shell (exoskeletons) The Coral Bands become inactive when it is time for it to shed. The shell splits down the back and the shrimp backs out of the old shell. Its new shell is too soft for it to move well, so it must rest while the new larger exoskeleton hardens; then it will become active again. The old shell is a perfect transparent copy of the shrimp. Don't think your shrimp has died when you see the empty shell. Rather, your shrimp is growing well. Remove the old shell from your aquarium.

If your shrimp becomes inactive, change 20% of the water. An inactive shrimp means your water quality is poor.

Try a Coral Band! It's a sweet invert treat.

Until next time...

Tony

Bob Tillman – OCA

Reprinted from the *Inside the Fish Room* column from the January 2005 issue of *Buckeye Cichlid Lover's Bulletin*, the publication of Ohio Cichlid Association.

OUTLINE FOR WRITING A FISH ARTICLE

This is very easy to use. Just answer the questions in one or two sentences (more would be okay, too), put the sentences together in paragraphs and email it to the Editor at (jtoddybas@aol.com).

You can add or delete to the information below to your liking. When complete, you would have just written an informative and useful article that will help others in successfully keeping the same fish.

A. Name of fish.

1. Common name.
2. Latin name.

B. Description of fish.

1. Color and general shape.
2. Sex differences.
3. Size at maturity and/or breeding.

C. Fish's natural state.

1. Geographic location.
2. Climate of area.
3. Water chemistry.

D. Set-up.

1. Pair or multiples.
2. How introduced to tank.
3. What substrate, plants, etc.
4. When to expect spawning.
5. How long to leave set-up.
6. Feeding during set-up.

E. Conditioning.

1. Were sexes separated? How long?
2. Food. What and how much.
3. Raise temperature?

F. Spawning tank.

1. Size.
2. Water temperature.
3. If chemistry altered, how.
4. What substrate?
5. Type of filtration.
6. Light source.
7. Tank distance from floor, traffic by tank.

G. Description of spawning.

1. What is spawning site?
2. Courtship and spawning actions.
3. Spawning colors and patterns.
4. Number and description of eggs.

H. Raising the fry.

1. How long until eggs hatch?
2. Special care of eggs?
3. Size of spawn and percentage of hatch.
4. When do fry begin to eat?
5. What is first food?
6. Special care of young.
7. Parental brood care.
8. Filtration with fry.
9. Growth rate.

I. Commentary.

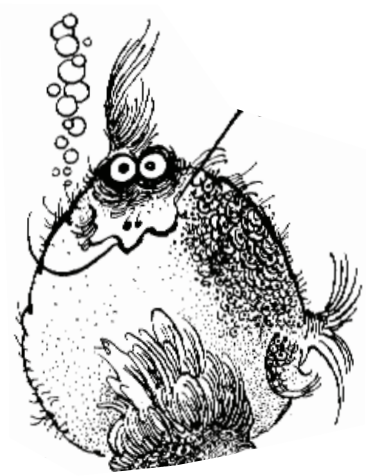
1. Difficulty obtaining pairs.
2. Interesting habits of adults and fry.

John Todaro – BAS
From the Brooklyn Aquarium Society's publication
SCRUMPTIOUS MEALS & LIVE FOOD TREATS Compiled, Edited & Written by John Todaro

Delicious Earthworm Snacks

For those of you with large fish that are eating you out of house and home, like cichlids. Most all meat eating fish of any size will gobble up earthworms as a delicious treat.

Cultivating earthworms might just be the answer to your problems, and guess what, you can grow them right in your own home. Yuck!



Earthworms can also be cut up and fed to smaller carnivorous fish. If you're squeamish about cutting up live earthworms (yuck again) and watching them wriggle, you can kill them first by dipping them in boiling water for 10 seconds. Don't forget to cool them down before feeding them to your fish.

But I think fish really enjoy wrestling with a live earthworm; it's all part of the fun of catching and eating them. Yum!

Here is what you need to grow your own at home, or in the garage. If your wife lets you!

Guess what? It's not so yucky!

RECIPE

SUPPLIES NEEDED:

1) A container with a minimum size of about 20" x 20" X 12". There are plastic storage boxes with covers that can be adapted for use as an earthworm "home." 2) You will need to get a starter culture of about 100 worms.

The cheapest and easiest way to get earthworms would be at a bait and tackle shop. You can also get them from Carolina Biological or Weekey Worms or others online.

PREPARATION:

Fill the plastic container with loose garden soil (without any additives such as fertilizer), mixed with a bucket full of rotting leaves and two raw potatoes chopped into small pieces.

Add the worms.

The worms should be fed with a cooked mashed potato and cup of oatmeal spread on top of the soil. Put back the damp cloth cover. When the food has been consumed, feed again.

Keep the earthworm container covered loosely (don't worry; the worms can't crawl out) or if you must cover the container, drill air in it, earthworms have to breathe too.

Within a few months, you should see large numbers of young earthworms in the soil. At this point, you can start feeding your fish. Periodically gently stir up the soil. Now you should have a continuous supply of fresh, live, earthworms for your fish. Yum!

Ryan Curtis – BAS

TheShrimpFarm.com is the place to go for freshwater shrimp. The new owner is **Ryan Curtis**, with a new mailing address: **The Shrimp Farm USA, 2401 East Washington St, STE 200 A2, Bloomimgton, Il 61704** and has set up an Aquarium Shrimp Forum **http://theshrimpfarm.com/forum/index.php**. You can go to this forum and ask questions, talk to other shrimp nuts and discuss anything and everything related to Freshwater Aquarium Shrimp.

Green Lace Shrimp

Scientific Name: *Atyoida pilipes*.
Other Scientific Names: *N/A*.
Common Name: Green Lace Shrimp.
Other Common Names: Green Filter Feeder Shrimp.
Origin: South East Asia.
Found in the wild: Yes.
pH Range: 6.5 - 7.8. Ideal pH: 7.2
Temperature Range: 72˚ - 80˚F. Ideal Temperature: 75˚F.
Hardness Range: 2- 10 dkh. Ideal Hardness: 5 dkh.
Life Span: 1 - 2 Years.
Gestation Period: 30 Days.
Size: 1/2 - 1"inch.
Diet: Omnivore.

GREEN LACE SHRIMP HISTORY

The Green Lace Shrimp is a new shrimp to the American Dwarf Shrimp hobby. This shrimp first started to gain popularity in 2007. Since its introduction to the hobby, it has quickly gained popularity due to its relatively small size for a filter feeding shrimp.

GREEN LACE SHRIMP CARE

Green Lace Shrimp require nearly the same care as Bamboo Shrimp. They are filter feeders so they should be kept in only aquariums that are well established and have quite a bit of micro foods floating around the water column. These shrimp are smaller than Bamboo Shrimp, but it is still recommended to keep them in an aquarium of 20 gallons or more.

GREEN LACE SHRIMP DIET

Green Lace Shrimp are filter feeders, and because of this, their food source has to be very small. Many well-established aquariums will produce all the food a filter feeding shrimp will need, but if supplemental feeding is necessary, foods intended for filter feeders can be used as well as powdered flakes and algae powders. It is also important to have a moderate amount of water flow in the aquarium so the Green Lace Shrimp can effectively filter its food from the water coulumn.

GREEN LACE SHRIMP BREEDING

There is currently very little information about breeding Green Lace Shrimp. It is suspected that they are a low order shrimp (shrimp hatch in a larval form) and breed very similarly to Bamboo Shrimp. It is also suspected that the larva of this shrimp require brackish/full salt water to reach adult form.

GREEN LACE SHRIMP BEHAVIOR

Green Lace Shrimp are extremely non-aggressive. This peaceful shrimp can be kept with anything that is not a threat to it. It will often be observed in a high flow area of the aquarium filtering the water for food. This shrimp seems to pick at the substrate much more than other filter feeding shrimp.

SPECIAL NOTES

As with all aquatic invertebrates it is important to make sure copper does not get into the aquarium. **Copper is toxic to all Dwarf Shrimp**. Many medications contain elevated levels of copper, so it is recommended not to medicate an aquarium with Dwarf Shrimp in it.

Ryan

Anthony P. Kroeger - BAS

REEF RULES

To reproduce nature in the form of a coral reef in their home, many components have to be considered. This article will look at a few of the rules you should follow to assure your success in the reef keeping hobby.

REEF RULE #1

Always quarantine anything live going into your reef aquarium! Let me repeat this again. Always quarantine everything!

There are many reasons for this, the most important of which is that it will prevent the entry of parasites, diseases or unwanted animals into your reef tank.

We all know fish can introduce a multitude of parasites or diseases into an aquarium, but so can corals and live rock. Here is an examples: in nature, various flatworms feed on coral. These can easily spread from coral to coral and may be small and very hard to see. Suddenly your corals are ruined.

Copper would kill the flatworms and your coral too. Melaleuca treats them, but now your whole tank is infected so you have to treat everything! If you had quarantined the coral in a small tank, the problem would be easy to solve.

Likewise, Mantis shrimp or predatory crabs can easily hide in live rock, as do fireworms and bristle worms.

So quarantine and save yourself a lot of headaches.

It's easy to do. Set up a bare 10-gallon tank with a piece of bio-seeded base rock, a powerhead for circulation and a small LED overhead light. Seed the tank with commercial aquarium cycling bacteria. It will live in the water and on the base rock.

Quarantine everything you buy in this tank for 15 to 30 days before you put it in your reef tank. Feed your animals during this time and change 20% of the water every 3rd day.

Watch your animals closely for any signs of parasites or diseases. If you see any, it's easy to treat in a small tank.

Watch your live rock for hitchhikers you do not want in your reef tank. Use a flashlight at night to check for the presence of mantis shrimp, crabs, fireworms and bristle worms. If you find any--remove them.

Check your corals for disintegration due to flatworms. Treat if necessary with Melaleuca.

Always quarantine! Remember Rule #1 and you will be much closer to a successful reef tank.

REEF RULE #2

The Oceans are a huge, stable, balanced (generally speaking) bio-system. As home aquarists, we try to replicate that balance to the best of our abilities.

Environmentally speaking, conditions in the Oceans are fairly stable in regards to water quality and change slowly.

Quarantine everything you buy in this tank for 15 to 30 days before you put it in your reef tank. Feed your animals during this time and change 20% of the water every 3rd day. Watch your animals closely for any signs of parasites or diseases. If you see any, it's easy to treat in a small tank.

This change may be seasonal in nature, such as runoff from rivers during monsoons, typhoons or hurricanes or it may be tidal in nature. Marine animals have adapted to this stable environment. It's not that they cannot adjust to changes, - they can, as long as the changes occur slowly over time. In our aquariums, we are dealing with a very small quantity of water in comparison to the Ocean. Our water quality can change much faster, many times too fast for our aquarium inhabitants to adapt without stress or even loss.

The best way to maintain good water quality in a reef aquarium (or any aquarium for that matter) is to make frequent, small, partial water changes.

If possible, 10 - 20% per change once a week is a good rule to follow.

There are many benefits derived from this, the major ones are as follows:

#1 Dissolved metabolic wastes and detritus are removed. This keeps your ammonia, nitrite and nitrate low. Low levels of these are critical to your reef's health and well-being.

#2 Trace elements are added. All quality marine mixes contain trace elements such as calcium and iodine. Your corals, clams, inverts and fish need these trace elements and absorb them out of the water. Just as you take your vitamins for good health, so give your reef its vitamins (trace elements).

#3 Water changes stabilize water quality. With frequent partial changes it becomes more difficult for conditions to skew drastically from a base norm. Yes, it is possible! But less likely as not, enough time has passed to accrue the necessary accumulation of waste products so as to diminish water quality.

#4 It gets you out of couch potato mode! Well, I'm not sure how beneficial that is to your fish, but it is beneficial to you!

So change your water! Both your reef aquarium and you will benefit.

REEF RULE #3

Keep it clean! Cleanliness is next to godliness or so the saying goes; in reef tanks, cleanliness is paramount to your success. We focus on equipment in here. I check my system daily to be sure all my equipment is functioning properly.

DO THE FOLLOWING DAILY

#1 Wipe off any encrusting salt deposits. Particularily on any wiring, if left uncleaned it can and will start fires. Especially check plugs into extension cords and outlets!
#2 I empty and clean my skimmer cup daily. After washing it out under hot water, I dry it with a paper towel. Than I soak it in vinegar or straight lemon juice for 15 minutes. Again I wash it in hot water and paper towel it dry before placing it back on the skimmer.
#3 Check all fittings and power heads to ascertain proper functioning.
#4 Check the heater to assure it is functioning properly.
#5 Check all wires and plug to socket connections to assure the safety of your home and family.

DO THE FOLLOWING TWICE A MONTH

#1 Breakdown and clean the skimmer. Use hot water and a soft bristle brush and pipe cleaners. After everything looks clean, soak everything again in a lemon juice or vinegar bath for 15 minutes. Then reclean and rinse everything and paper towel it dry and reassemble and restart it. The lemon juice and vinegar removes all bio-film and leaves the skimmer feeling squeaky clean.
#2 Change 25% of the filter media. This allows the rest of the filter to reseed the new media and keeps the filter from clogging. Because you only replace a portion of the media, it does not effect the stability of the water or the bio-filter.

DO THE FOLLOWING ONCE A MONTH

#1 Once a month, remove and clean all siphons and return hoses for all equipment. I clean them as I do the skimmer; I use properly sized bottle brushes (soft) and pipecleaners for this. Always throughly dry hoses before reconnecting them so as to ensure a tight waterproof fit on reconnection. Always check for leaks after restart.
#2 Clean all powerheads; follow the skimmer directions above.

DO THE FOLLOWING TWICE A YEAR

Replace your light bulbs. All light bulbs diminish in both output and intensity over time, to the detriment, especially, of your corals and clams. Replace them every 6 months to give these inverts the light they need. Follow these rules of cleanliness and you are one step closer to keeping a successful reef tank.

REEF RULE #4

Test! Test! Test!

Knowledge is power! That is simply a fact. We can observe our reef tanks all day and notice any problems, but we may not know what the cause is of what we see.

Water quality test kits help us establish exactly what is going on in our reef tanks.

On all my marine aquariums, I test salinity daily. Yes, I know salinity seldom changes that fast as to cause problems, but especially in summer heat it's amazing how much water can evaporate out of the top of your aquarium. So to prevent any problems, I test daily with a good hydrometer. This takes all of 60 seconds to do, so even with multiple tanks it doesn't take long to test. To me, it's well worth my peace of mind.

I test for ammonia, nitrite and nitrate weekly according to the manufacturers' instructions on my test kits. I also test pH weekly.

These 4 basic parameters and salinity are where most water issues arise. By staying on top of them you stay ahead of any problems.

I keep a "water quality" diary for every aquarium I have in which I note in my daily salinity and weekly test results. (see sample below)

Keeping water quality logs allows me to track trends in my aquariums and project where a problem will occur if any readings start to skew out of their normal parameters.

This log also allows me to look back over the water quality history and stability of any particular tank, which lets me better place any sensitive species into the most stable aquarium/environment.

I test for calcium, magnesium, strontium, phosphate and iodine

Tank #1 Log

Daily Date	Salinity	pH	Ammonia	Nitrite	Nitrate

twice a month. Again, follow the instructions on the manufacturers test kits.

All of this information is also logged into my water quality diary. Over time, you will obtain an accurate cycle assay of your water quality. You could easily put your "diary" on your PC or laptop if you prefer. I keep both a written diary and a laptop diary.

Test kits provide invaluable information to a reef aquarist. The more you test, the more knowledge you gain, and knowledge is your key to success with reef aquariums.

REEF RULE #5

Keep it moving! Your water, that is. The oceans are huge. Large quantities of water are circulated via currents such as the Gulf Stream.

Reefs are surrounded by currents which flow past and through them 24/7, 365 days a year. So in nature, reefs are used to currents.

Since we are trying to simulate nature's conditions in our reef tanks, currents become essential to such efforts.

Certainly our aquariums' inhabitants will respond to them.

But how do we make currents? And why have a rule to "Keep it moving?"

Making currents is the easy part. Our filters add some currents. Use powerheads aimed in opposite directions to make more.

If you have adjustable head direction powerheads (most powerheads are of this design), you can adjust your currents frequently if you so choose. I adjust my outflow daily. Place the powerheads on timers that partially overlap (Ex. 6 am to 10 pm and noon to 6 am). This varies the strength and direction of your currents for your animals' multiple times during the day.

Ocean currents are powerful. In the aquarium, I size the powerheads 25% higher than the labelled capacity.

So, for example, if a powerhead is rated for a 55-gallon aquarium I'd use it in a 37 gallon tank. I use 2 powerheads in my reef tanks. I've also used multiple small capacity powerheads under the same measurements as above with great success. If your currents are too strong, your corals will close up. But I have found that rarely to be the case. Normally, they will open wide to feed on the bounty the current brings them. The vast majority of corals like a strong current.

Now on to the rules: Why keep it moving? Three reasons: **#1** A strong current will flush detritus from under and within base rock crevices into the water column so your filter can pick it up, keeping your tank cleaner. **#2** It also will push suspended food materials past your corals for them to feed on.

It's a "natural" condition for your animals and they behave and respond to it, making our aquarium simulation closer to nature's conditions. As we want the best for our charges, this is desirable.

It sounds simple, but currents benefit your animals and make your maintenance easier. It's a win - win! Follow these rules and you'll have a winning reef tank!

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www.ManhattanAquarium.Com • www.UniqueCorals.Com

PETLAND DISCOUNTS, the complete pet store, carries a full line of pet supplies for fish, dogs, cats, birds, reptiles and small animals. Also a variety of fish, birds, small animals and reptiles. Open 7 days a week. Locations in New York, New Jersey & Connecticut. Over 15 stores in Brooklyn. Shop on line at: PetlandDiscounts.Com or see the white pages, for a store near you.

WWW.PETLANDDISCOUNTS.COM.

REEFS2GO.COM. They're located in sunny Florida. Visit their web site to view the full line of saltwater fish, inverts, corals, live foods for marine fish and corals plus a complete line of saltwater dry goods and equipment. Get all the details on **FREE SHIPPING** and their **14 day Guaranteed Living or Credit policy**. If saltwater is your passion and you're looking for deals, check their Daily Deals and Over Stocked Items page. **For more great buys, check Buy 1 get 1 Free Offers**. Check out the site. Read the testimonials and if you still have questions, call them Monday to Thursday from 10AM to 5PM EST at **727-623-0914.**

PACIFIC AQUARIUM & PET INC., in Manhattan's Chinatown, carries ornamental goldfish, koi, freshwater fish, & aquatic plants. **BAS members get 10% discount with current card** (Discounts not to be combined with other specials). They have a full line of aquarium supplies. 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

WORLD CLASS AQUARIUM has been serving the hobby since 1986. *New Yorker Magazine* recognized them as the *"best aquarium supply store in the five boroughs."*
You'll be pleased to know that they:

- Offer a large selection of freshwater, marine fish, corals, plus a full line of aquarium, bird, and small animal products.
- **They give a 10% discount to BAS members with a current membership card.**
- Carry a selection of large and small tanks and cabinets.
- Have a marine biologist on staff.
- Design and install aquariums for educational institutions.
- Do maintenance for home or office aquariums.
- Build glass tanks and sumps to your specifications.

If you're into birds, check out their selection of hand-fed baby parrots, African grays, cockatoos, macaws, Amazons, conures, parakeets, and canaries.

Call or stop by to see what new babies have arrived!

Owned by two hobbyists, **Allan** and **Robert**, who offer a personal touch and pride themselves on "world class" quality. They're always available to answer questions.
You can also subscribe to their Newsletter.

Visit **www.WorldClassAquarium.com** and sign up.

WORLD CLASS AQUARIUM
2015 Flatbush Ave., Brooklyn, NY 11234
Ph: **(718) 258-0653** • F: **(718) 258-4637**
Store Hrs: Mon - Sat 10AM - 7PM Sunday 10AM - 6PM

ZOOMED AQUARIUM LED HO - Energy efficient LED Aquarium lighting with a low profile design!

- Unique modular design allows for replacing or swapping out LED panels.
- Includes High Output 1W white LEDs, and blue 500mW for nighttime 'lunar' effect.
- 50% brighter than T5 HO fluorescent lamps. More LEDs than comparable hoods on the market = more light!
- Shimmer effect: Bright white light produces shimmer, just like in nature.
- Dual Switches for independent control of white & blue LEDs.Adjustable sliding rail.
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- Individual LED modules allow for easy replacement. Never throw another LED hood away again!
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Membership & Renewal Application Brooklyn Aquarium Society

Mail This Form and Your Check Payable to **Brooklyn Aquarium Society** to
BROOKLYN AQUARIUM SOCIETY, ATT: MEMBERSHIP CHAIRPERSON
P.O. BOX 290610, BROOKLYN, NEW YORK 11229-0011

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:
WWW.BROOKLYNAQUARIUMSOCIETY.ORG

NAME_____OCCUPATION_____

ADDRESS_____CITY_____STATE____ZIP_____

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

E-mail Address_____

TYPE & LENGTH of MEMBERSHIP: (CHECK ONE)

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

*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 contact 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_____