AQUATICA

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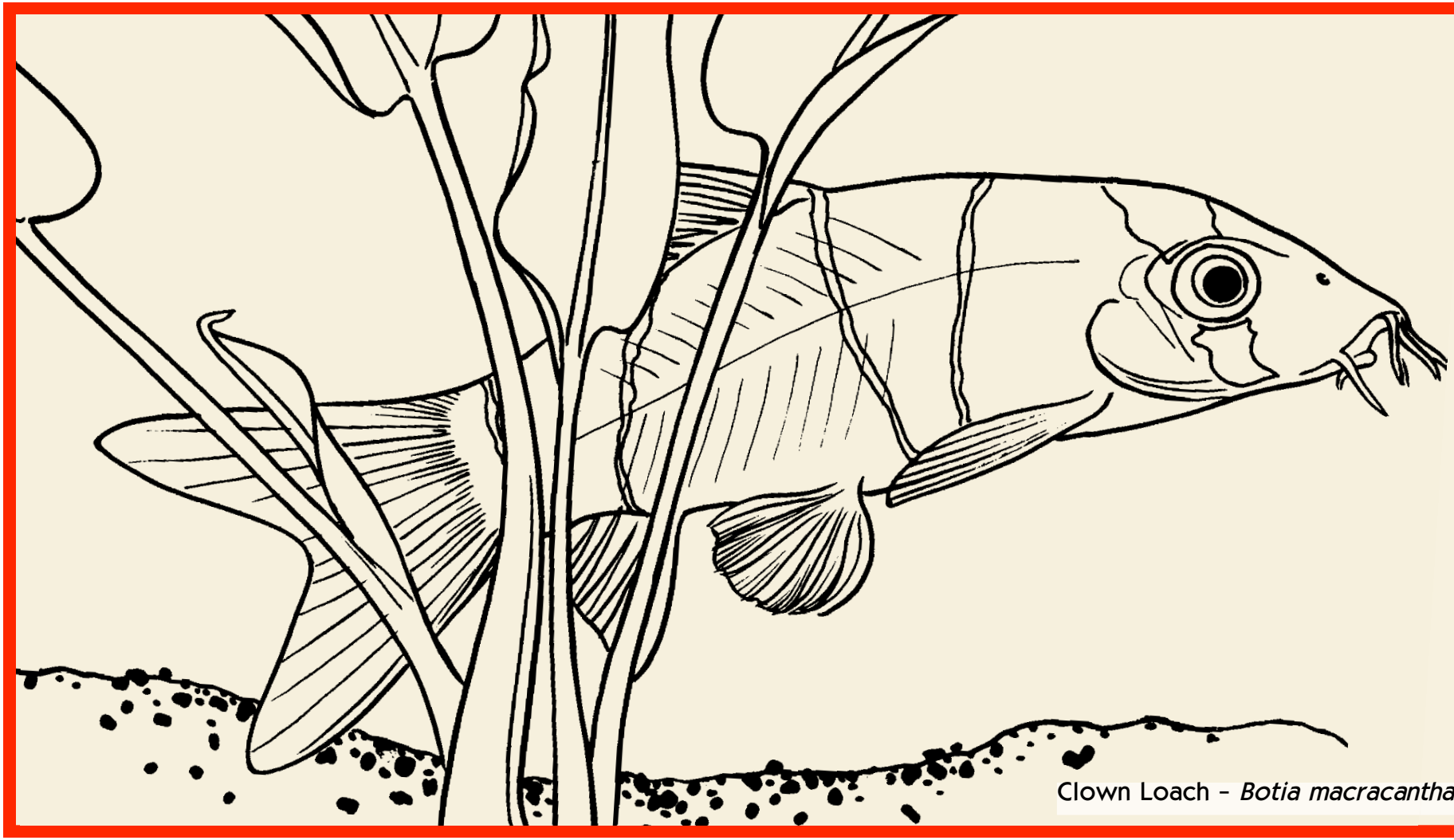

Clown Loach – *Botia macracantha*

AQUATICA

VOL XXIV · JAN/FEB 2010 · NO 3

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AQUATICA STAFF

The **Brooklyn Aquarium Society Inc.** is a non-profit organization 501(c) (3) for people interested in the aquarium hobby and the study of aquatic life. The Society meets the 2nd Friday of each month except July and August at the Education Hall of the New York Aquarium at Coney Island, Surf Avenue at West 8th St., at 7:30 PM. Meetings are open to visitors. Refreshments are served. Membership is $25 per year family/$20 individual/$15 for students under 14. Send inquiries or membership checks payable to:
Brooklyn Aquarium Society, c/o Membership Chairperson, P.O. Box 290610, Brooklyn, NY 11229-0011.

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

BROOKLYN AQUARIUM SOCIETY
CALENDAR OF EVENTS
2010-2011

••••• 2010 •••••
HAPPY NEW YEAR

JAN 8 Omar Mojena (Hikari) ~ Fish Nutrition • Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction • Discount books & sales • Door prize • Raffles.

FEB 12 Todd Gardner ~ Making The Jump To Saltwater • Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction • Discount books & sales • Door prize • Raffles.

MAR 12 Bob Scherer (Water Gardens, Northport, NY) ~ Pondering Ponds • Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction • Discount books & sales • Door prize • Raffles.

APR 9 Tony Pinto ~ Deep In The Kapuas: Collecting Bettas & Anabantids In Borneo • Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction. Discount books & sales • Door prize • Raffles.

May 14 Spring Auction Extravaganza ~ Freshwater fish, plants, marine fish, aqua-cultured corals & dry goods auction including a new 55 gallon tank & stand • Discount books & sales • Raffles • Door prize and much more.

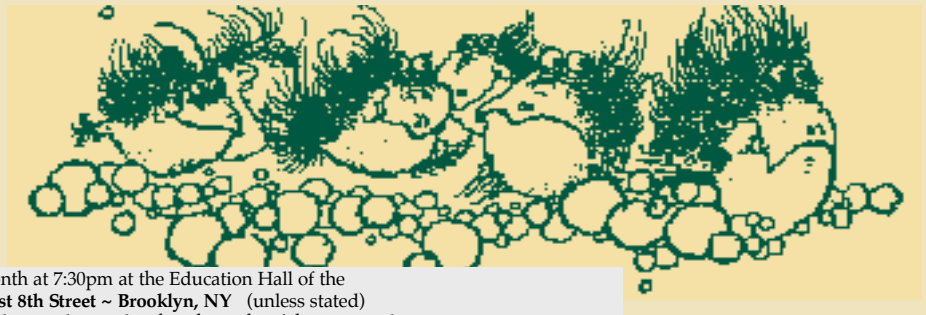
JUN 11 Richard Ross ~ Cephalopods: Is There An Octopus In Your Future? ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction • Discount books & sales • Door prize • Raffles.

SEPT 10 Jeff Bollbach ~ A Year In The Fish Room ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction • Discount books & sales • Door prize • Raffles.

OCT 8 Fall Giant Auction Freshwater fish, plants, marine fish, aqua-cultured corals & dry goods auction including a new 55 gallon tank & stand • Discount books & sales, Raffles • Door prizes and much more.

NOV 12 Pat Donston ~ Reef Care Conflicts, Who's Right?~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction • Discount books & sales • Door prize • Raffles.

DEC 10 BAS Holiday Party ~ Members, their families and friends, all you can eat sit down dinner • Fish Bingo & Prizes • BAS Awards presentations



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

FREE REFRESHMENTS AND FREE PARKING AT EVERY MEETING - UNLESS STATED

NOTICE TO ALL MEMBERS

A motion was made, seconded and passed at the March board meeting (3/7/08) that membership cards be made up and handed out the night a person joins the BAS. If you join or renew by mail you must come to the next general meeting to get your card. Publications will still be sent by mail.
Web memberships do not get a card, and only get publications that may be on-line. The cost of mailing has gone up and this is a cost-saving measure.

Dan Hagan - Dan has been gracious enough to consent to be BAS's Freshwater Shrimp Editor.

Dan runs TheShrimp Farm.com. This site sells freshwater shrimp.

Dan's personal site, ShrimpFarm.com, has lots of information on dwarf shrimp. He also runs a blog. It's a great site with reliable and accurate information about freshwater dwarf shrimp. Dan has been gracious enough to consent to be BAS's Freshwater Shrimp Editor.

For all those members who are keeping all-planted tanks, Dwarf freshwater shrimp are the perfect aquatic inhabitants for these under water gardens. This is the second column by Dan and in it he gives you the basic knowledge on freshwater shrimps. In future columns, he will describe the different species of shrimp that are now available to aquarists. If you're interested in keeping freshwater shrimp or have a question about them, go to Dan's blog site and ask your question.

EVERYTHING you always wanted to know about DWARF SHIMP but were afraid to ask!

Breeding Dwarf Shrimp

When keeping Dwarf Shrimp in the home aquarium, one of the most exciting aspects is their ability to multiply rapidly. Most Dwarf Shrimp can double their population in three to six months, and this trait is making them more and more popular in that home aquarium trade.

For the purposes of this article, Dwarf Shrimp will be defined as any freshwater species of shrimp found in the *Caridina* and *Neocaridina* genera. These genera include the extremely popular Red Cherry Shrimp (*Neocaridina heteropoda*), the highly refined Crystal Red Shrimp (*Caridina cf. cantonensis*), and one of the first shrimp in the hobby, the Amano Shrimp (*Caridina multidentata*)

For Dwarf Shrimp to breed, there are 3 conditions that must be met. There must be a sexed pair of shrimp in the aquarium, all water parameters must be stable and there has to be a stable source of food. Each individual species of Dwarf Shrimp will have their own individual water parameter requirements and different ways of sexing the shrimp.

Sexing Dwarf Shrimp varies from species to species, but there are a few constants among most Dwarf Shrimp. In general, the female will be larger and often more colorful. The female will also have a larger, broader tail section. In shrimp species that have a clear to semi-clear exoskeleton, a saddle can be seen on mature females. This saddle is the eggs developing in the female's ovaries. Most male Dwarf Shrimp are smaller in size, often less colorful and have a thinner tail section.

Although the water requirements vary from species to species of Dwarf Shrimp, it is most important that all parameters be stable. Dwarf Shrimp should only be kept in a fully cycled and well-established aquarium. Ammonia and Nitrites are very toxic to Dwarf Shrimp and should always be kept at 0 PPM (parts per million). Nitrate can be toxic as well and should be kept bellow 20 PPM, with less than 10 PPM being ideal.

Many of the *Caridina* species require soft, slightly acidic (pH 6.0 – 6.8) water that is slightly cooler than tropical (65°-72° F). Most *Neocaridina* species are a little less demanding. They often require a neutral pH (6.8-7.5) and are undemanding when it comes to water hardness. *Neocaridina* species prefer more tropical water temperatures (72°-80° F). Again, stability is the most important factor.

A healthy Dwarf Shrimp will breed more readily and more prolifically and food is an import factor in Dwarf Shrimp health. To ensure optimal breeding conditions for Dwarf Shrimp, a constant food source must be provided. Whether it be an aquarium with a large amount of naturally occurring algae or

EVERYTHING you always wanted to know about DWARF SHRIMP but were afraid to ask!

foods specifically intended for Dwarf Shrimp, as long as there is a stable source of food, Dwarf Shrimp will reproduce quickly.

Once the three conditions have been met, and the sexed pair of shrimp are mature, the breeding process will begin. First, a female will find a comfortable hiding spot in the aquarium. Once she has become comfortable, she will molt (molting is the shedding of the exoskeleton to enable growth of invertebrates). After molting, the female will release a pheromone into the water indicating to the male shrimp her readiness to breed.

The pheromone in the water will sometimes cause the male shrimp to swim erratically in search of the female. Once the male finds the female, he will mate with her. They will mate belly-to-belly, and the male will deposit sperm. This process does not last very long, and because the female is hiding most times it is rarely observed.

After the mating process has occurred the female will pass her eggs through the sperm and deposit them in her pleopods (swimming legs) under her tail. The female shrimp will carry the eggs until they hatch, normally in 20-40 days. The female will often be observed fanning and cleaning the eggs. Once the eggs hatch, there is no longer any parental care of the young shrimp.

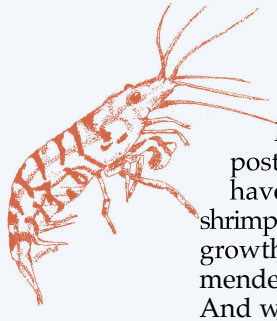
There are two types of Dwarf Shrimp, high order and low order. Low order shrimp hatch as larva and oftentimes require saltwater or brackish water to mature into small shrimp. High order shrimp hatch as miniature versions of the adult shrimp and require no special care.

Raising low order shrimp can be quite challenging. Upon hatching, the larva need to be transferred to saltwater. These larvae are very small and require food that they can fit into their mouths. Many of the larvae require single cell algae as a first food and graduate to larger foods as they grow. Once the larvae goes through its metamorphosis into a miniature versions of the adult shrimp, they need to be transferred back into freshwater and cared for the same way an adult shrimp would be.

Raising young high order Dwarf Shrimp (or post metamorphosis low order) is fairly easy. They have the same care requirements as the adult shrimp and require no special attention. To increase growth rate, smaller high protein foods are recommended (decapsulated brine shrimp eggs are great). And when performing water changes (recommended 15% twice weekly), it is important to make sure not to suck up the young shrimp. Placing a piece of new panty hose over the intake of the siphon tube will prevent small shrimp from being sucked up!

If you are interested in breeding Dwarf Shrimp, make sure you have a sexed pair of shrimp, place them in a cycled and well-established aquarium, and feed them well. Nature will take its course and soon you will be caring for young shrimp. Dwarf Shrimp will breed faster and the young will survive at a much higher rate if the aquarium is a species-specific aquarium. So keep these things in mind and beware of the addictive nature of caring for Dwarf Shrimp.

EVERYTHING you always wanted to know about DWARF SHIMP but were afraid to ask!



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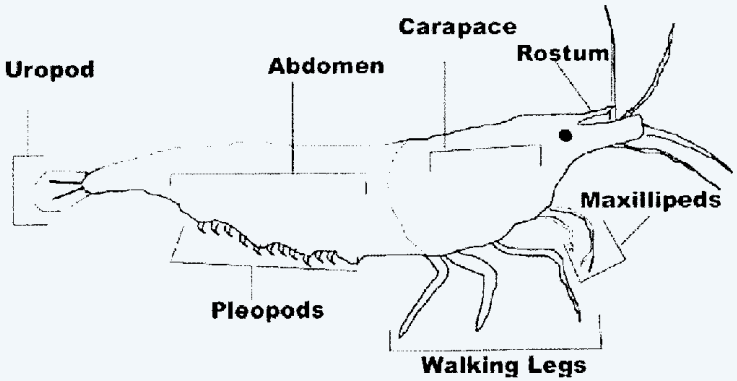
Quick Reference Guide

NAME	COMMON NAMES	USE
Abdomen	Tail section	Swimming, holding eggs
Carapace	Head section	Protecting vital organs
Maxillipeds	Claws	Modified legs used for feeding
Pleopods	Swimmerettes	Swimming, holding and fanning eggs
Rostrum	Nose	Defense (mostly useless for dwarf shrimp)
Uropod	Tail	Swimming
Walking Legs	Legs	Walking



MORE DETAILS

NAME	DETAIL
Abdomen	This section of the dwarf shrimp is the most muscular section of the shrimp. In many shrimp it is nearly see-through.
Carapace	The carapace is the strongest section of a dwarf shrimp. The shell on this section is thicker to protect all the shrimp vital organs. All legs, maxillipeds, the rostrum and eyes are attached to the carapace.
Maxillipeds	The maxillipeds are the modified legs that have small claws on the end of them used for eating. In long arm shrimp, one pair of these extends and becomes quite large.
Pleopods	Pleopods are the small swimming legs found on the underside of the Abdomen. These legs are used for swimming through the water column. They are also used by female shrimp to carry and clean eggs until they hatch.
Rostrum	The rostrum is the pointed "nose" on the front of the dwarf shrimp. In some shrimp, it is used for defense, but in dwarf shrimp it is nearly useless for this. The Rostrum is one of the most important identifying attributes for many dwarf shrimp.
Uropod	The uropod is the tail section of a dwarf shrimp. This tail allows the shrimp to have a rapid backwards acceleration when flicked using the muscular abdomen.
Walki Legss	Walking legs are exactly what they sound like. They are the legs a dwarf shrimp uses to walk.

This is by no means a complete anatomy of dwarf shrimp, it is a quick overview to aid hobbyists when discussing their shrimp.

Aquarium Guys was founded in early 2004 in order to provide fellow aquarists with the best in high quality aquarium supplies at low prices.

They are based just outside of Philadelphia, Pennsylvania. Their number one goal is customer satisfaction and they try to meet this goal by providing low prices on a wide range of products and by providing quality customer service. They currently ship to the USA only. They do not have a printed catalog at this time. To visit their site, go to support@aquariumguys.com or you can call them toll-free at 1(866)619-3609.

The follow Glossary of Aquarium Terms has been reprinted from their web site. They encourage readers who find this information beneficial to share it with friends or other interested parties.

AQUARIUM GUYS
AQUARIUM TERMS & DEFINITIONS

A list of terms commonly used in the aquarium industry or hobbyist community - it can be a lot to figure out, especially when just starting!

ACTINIC LIGHT Actinic light comes from the blue end of the color spectrum, so it appears blue and is usually combined with a full spectrum (white) lamp for clear viewing. Blue light travels furthest in the ocean, and is essential to photosynthesis in zooaxanthellae algae, a symbiotic algae which photosynthetic corals and invertebrates need to live.

ACTIVATED CARBON A form of carbon derived mostly from charcoal with ideal surface area and porosity for the adsorption of chemical compounds from your water, like medicines, odors or discoloration. Carbon must be changed every 1-2 months, to avoid leaching impurities back into the water.

ADSORPTION If absorption is when a substance is soaked up by another - think of a sponge - then adsorption would be if the sponge accumulated liquid around itself to form an outer membrane. Chemical filter media removes waste by adsorbing it.

AERATION Refers to the injection and distribution of air into your tank, either by gas exchange at the water's surface, an air pump or powerhead with venturi jet. The purpose of aeration is to supply water with enough dissolved oxygen to sustain life.

AIR PUMP A pump that injects air into your aquarium, to drive sponge filters or under gravel filters, protein skimmers, air stones, etc. Many filters introduce some amount of oxygen to your water, but air pumps are important to proper aeration in larger/heavily stocked tanks. High pressure air pumps are available for really large/deep tanks.

AIR STONE Block of porous limestone or wood which, when air is forced through it via an air pump, diffuses a stream of tiny micro-bubbles that create a dynamic visual effect and aid in oxygenation. Used in air-driven protein skimmers as well. Air stones slow down as they get clogged, so clean or replace them when this happens.

ALGAE These plant-like organisms grow whenever they have water, light and nutrients. There are many types - from annoyingly resilient green or brown slime, to macroalgae that resemble normal plants, to coralline algae which is an attractive accent in reef tanks. Some things commonly thought of as algae are actually cyanobacteria, like the "blue-green algae" spirulina.

ALGAL FILTER One approach to reducing nitrates in a saltwater tank. An algal filter uses macroalgae, which, like all plants, consume nitrates. Algal filters are usually housed in a sump chamber, since macroalgae grow quickly.

ALGICIDE Chemical treatment that kills big algae blooms quickly. They will not treat the root cause of algae problems - too much sunlight or the wrong spectrum of lighting, too many nutrients from overfeeding, phosphates or silicates in water or high nitrates - and could cause more complications by overloading your filters with a heavy wasteload of dead algae. Never use in tanks with live plants or invertebrates.

ALKALINITY A measure of your water's resistance to changes in pH (or "buffering capacity"). Commonly measured as carbonate alkalinity (kH) or total alkalinity (gH). Alkalinity can be raised by adding a buffer when you condition your water.

AMMONIA NH3. Produced as the first waste gas in the nitrogen cycle from decomposing food or fish poop. It is toxic to most creatures in very small amounts until converted into nitrates by your biological filter. You should not be able to detect ammonia in a healthy, functioning and cycled tank.

AEROBIC Describes an organism or process that consumes oxygen to function.

ANAEROBIC "Without air." Refers to an area with no dissolved oxygen - these can build in pockets between rocks without adequate circulation, or under fine grained substrates unless you have a burrowing organism to stir it up. Anaerobic bacteria are cultivated in some types of systems like deep sand beds because they are able to convert nitrates into harmless nitrogen gas. However, in most systems anaerobic bacteria are not desirable; they produce hydrogen sulfide and other toxins.

AQUACULTURE Refers to the farming or "culturing" of aquatic organisms, either within existing bodies of water or in isolation. When done ethically, this is a practice which can prolong the life and health of the world's natural coral reefs and aquatic ecosystems.

ARAGONITE A form of calcium carbonate that makes up coral skeletons; it is found in reef sand and coral substrates. Aragonite can help to harden your water/raise pH.

ARTEMIA Scientific name for brine shrimp.

BALL VALVE A simple, durable shutoff valve design used in flow control. Especially useful in adjusting high pressure flows such as those from pumps or canister filter returns.

BALLAST Any type of fluorescent lamp or metal halide lamp must be plugged into a ballast before a power source, because gases in the bulbs are unstable and they can actually explode without a ballast to ground them. Ballasts are often built into fixtures; if buying one separately, it must match to the type of bulb you are using (a metal halide ballast must be for either single ended or HQI bulbs, and must match the wattage). Different types of fluorescent lamps may not be compatible in the same fixture, such as Very High Output lamps vs. standard fluorescents.

BERLIN FILTER Low maintenance wet/dry filter design invented in Germany. Extremely minimal and natural, it is quite popular with reef aquarists. It consists of a sump full of live rock as the biological filter, lighting to keep the

AQUARIUM TERMS & DEFINITIONS

organisms on the rock alive, and a protein skimmer for mechanical filtration.

BIOLOAD/BIO-LOAD Term that describes how much waste is produced by the organisms in your aquarium. The heavier your bioload, the more filtration & circulation you need. Some fish create disproportionately large bioloads, like goldfish and Oscars. Your aquarium's capacity to handle a bioload is limited by its size, which is why you shouldn't overstock a tank.

BIOLOGICAL FILTRATION What we call biological filters are just housing - their main function is to maximize surface area for colonization by billions of helpful bacteria that do the actual filtering itself. These bacteria are the only way to break down naturally occuring toxic wastes in a process called the nitrogen cycle. Biological filtration is the most important type. Without it, your aquarium is uninhabitable. Biological filters include sponge filters, under gravel filters, wet/dry filters and even live rock, though most filter styles offer it in some capacity.

BLACKWATER Really a clear, light yellowish-brown, "black water" refers to conditions in rivers like the Amazon which flow through rich vegetation (e.g., a rainforest). Plants at the water's edge leak "tannins" into the water - the same thing that dyes your water when you make tea. Tannins are acidic and create the soft water conditions preferred by Amazon fishes.

BOTTOM FEEDERS Organisms like catfish, crustaceans and mollusks are usually bottom feeders - they scavenge or feed on things that live on the ground. Food for bottom feeders is designed to sink quickly.

BRACKISH Brackish water is a mix of fresh water and salty ocean water that occurs in the mouths of many rivers (these areas are called estuaries) as well as mangrove swamps and certain lakes and small oceans, like the Baltic. The salinity of these habitats changes with the tide, so brackish water species are a lot hardier than most. Many fish spawn or spend part of their lives in brackish conditions.

BRINE SHRIMP Brine shrimp are a high fat, tiny organism that is a great food for fry and a nice occasional treat for freshwater fish. They do not contain the right kind of fat to sustain marine organisms and so should not be fed to them unless they are "gut-loaded," or enriched by a diet of appropriate fats. Can be easily hatched as live food and eggs; if dry, stay good for years. Bizarrely, many of us first encountered these as "sea monkeys."

BUBBLE WAND A bubble wand is powered by an air pump and creates striking displays of tiny bubbles along the length of the wand. Unlike an air stone, a bubble wand makes a "curtain" of bubbles that can be shaped to follow edges or frame objects in your tank. Purely for decoration and a mild boost to gas exchange.

BUFFER A "buffer" or buffering solution is essentially a solid dissolved in water that boosts the alkalinity ("hardens") or adjust the pH. Examples include calcium carbonate. Buffer is also a verb: the more dissolved solids, the more your water can "buffer" or stabilize against small changes in water conditions.

CALCIUM Undoubtedly the most important trace element on the reef, dissolved calcium is used to create the striking skeletal structures of mollusks and corals that form the backbone and beauty of these habitats. Ocean water contains about 410 ppm of this mineral the world over - it's actually supersaturated, meaning, there's more calcium than water should actually be able to hold, due to the presence of mediating factors (most importantly, magnesium). Some form of calcium must be added to saltwater tanks, usually with a reactor, and replenished as depleted.

CALCIUM CARBONATE $CaCO_3$. Calcium in sea water precipitates (becomes a solid) as calcium carbonate, which forms the shells of mollusks and the skeletons of corals and invertebrates. calcium hydroxide $Ca(OH)_2$. See kalkwasser.)

CANISTER FILTER The canister filter is completely external to the aquarium, unlike most filters which hang on the tank or are submerged. It consists of one or more "canisters" filled with filter media - because tank size doesn't matter, a canister can be much larger than traditional filters and provide more surface area for better filtration. A water pump (usually built-in) forces pressurized water through the canister.

CARBON See activated carbon

CARBON DIOXIDE Carbon dioxide (CO_2) is vital to plants. Injection of CO_2 (using CO_2 reactors or DIY systems) also softens water. Plants release oxygen during daylight hours, but at night they produce carbon dioxide, so there's no need to add CO_2 at night (and using an air pump during those hours may be a good idea too).

CARNIVORE An organism that eats the flesh of other organisms to survive, either through predation or scavenging.

CHECK VALVE An automatic valve that allows liquid or gas to flow through in one direction only. Important to aquarium plumbing as a well placed check valve can help avoid overflow or back-siphoning.

CHEMICAL FILTRATION Chemicals are removed from your water with activated carbon or ion-exchanging resins in your filter. You may only need chemical filtration if you've used medicines or experience unwanted odors, colors or contaminants in your water like silicates or phosphates. Chemical filter resins usually need to be exchanged or

AQUARIUM TERMS & DEFINITIONS

removed within a month or 2 to avoid leaching chemicals back into your water.

CHILLER A pricey device that cools down your water. Chillers may be necessary if you have a lot of submerged equipment raising your water temperature, if you're using metal halide lighting, or if you live in a warm climate but keep cold water organisms.

CHLORAMINE Sometimes present in tapwater, where it's added to kill bacteria. Supposedly harmless to humans, but is poisonous to fish and kills good bacteria. Chloramine won't evaporate from water, but chlorine removers will get rid of it.

CHLORINE Like chloramine but more widely used, chlorine is added to tapwater to kill bacteria. It's poisonous to fish and good bacteria, but can be removed by dechlorinators, or by letting water sit out for 24 hours.

CICHLIDS An incredibly diverse family of fresh and saltwater fish from South America and Africa. Characterized by striking shapes, colors, and personalities, many are aggressive and shouldn't be combined with others. Common aquarium cichlids include freshwater angelfish, oscars, and discus. Rose to popularity as freshwater aquarists sought further challenges, since these fish often have very specific needs.

CIRCULATION Proper circulation is the healthy movement of your entire volume of water, quickly enough to distribute trace elements and oxygen throughout the entire tank. Poor circulation is incomplete or inadequate movement that deprives areas of your tank of essential nutrients or elements, as well as reducing the efficiency of filters, heaters and other devices that rely on water flow. Water pumps increase circulation (many filters include pumps).

CLARIFIER See water clarifier.

COMMUNITY TANK Fish tank housing multiple species of organisms that can live together peacefully.

CONDITIONER A conditioner is used to prepare tap water or filtered water before you add it to your aquarium. Water conditioners may remove chlorine and heavy metals in tap water, they may boost your fish's slime coat, or they may try to approximate special conditions, like Amazon blackwater conditioners.

CORAL PROPAGATION See fragging.

CORALLINE ALGAE An encrusting pink-purple algae that is a prized member of the reef tank and a main food source for some creatures, including sea urchins and parrotfish. (It may appear in other colors, but is typically reddish.) Calcium deposits from sea water make this algae hard. Coralline algae will encrust rock and the walls of your tank, and makes a lovely display on the back and sides of your tank. It needs actinic light to thrive.

CURRENT Current describes flow (water currents, electrical currents). Natural water current patterns are important to consider when designing healthy circulation for your aquarium - particularly in marine tanks, where natural currents are quite vigorous. Powerheads are primarily used to recreate current patterns.

CYCLING Process of establishing a complete nitrogen cycle in your tank. Before a tank cycles, it contains free toxic agents like ammonia and nitrite that kill most organisms and cause discomfort and shortened life cycles for others. Cycling can take up to two months, but can be aided by natural cycling aids.

CYCLING AID An additive meant to speed up cycling in an aquarium. You will not be able to tell it's working without testing for ammonia, nitrites and nitrates at every step of the cycling process. Nitrites must spike from 0 and return to 0 before the cycle is complete. Natural cycle aids include established biological media from other tanks, or live plants.

DEIONIZATION/DEIONIZER A process for filtering tap water of impurities before adding to the aquarium. Deionization removes important trace elements that should be replaced before adding to your aquarium. Deionizers are often combined with reverse osmosis filters.

DEEP SAND BED A technique used to reduce nitrates in saltwater aquaria, a DSB is 4"-6" of very fine grained sand. Sand stirring organisms like burrowing mollusks or fish keep the top layers oxygenated, while the depth of the bed ensures that its deepest layer receives no oxygen, thereby allowing anaerobic bacteria to grow. These bacteria can convert nitrates into harmless nitrogen gas, one of few ways to remove nitrates from water. Care must be taken with the DSB because of toxic gases also produced by these bacteria. Several variations exist, including the Plenum sand bed and remote deep sand bed (RDSB; kept outside aquarium, in a sump).

DIATOM FILTER Specialized mechanical filter that uses diatomaceous earth to remove very fine particles from the water. They are the most effective mechanical filters, but because of this they would clog constantly if used all the time. They're used for regular maintenance to polish (clarify) water - regular use is proven to remove hard to kill disease agents for healthier water.

DIATOMACEOUS EARTH Sediment composed of fossilized diatoms; appears to be a very fine powder. Its porosity makes it a uniquely powerful filter media but take care not to inhale it or it can cause respiratory problems. Used in all sorts of commercial and ecological applications.

DIATOMS A primitive single-celled algae; also a common phytoplankton. Diatoms are unique for having hard, silica-based shells that stay behind when diatoms die to become "diatomaceous

AQUARIUM TERMS & DEFINITIONS

earth,"which has many commercial applications because of its extremely fine pore structure. Main aquarium use: diatom filters.

DISCUS Beautiful South American cichlid with a distinctly round, flat shape and vibrant colors. They are a schooling fish, so keep them with at least 4 other discus. They are sensitive to water conditions.

DISPLAY TANK A tank used to display and house fish under normal circumstances, as opposed to quarantine tanks, which are usually kept mostly bare.

DIY "Do It Yourself."A good way to tackle some aquarium projects if you have the skills or are willing to learn. Prime candidates for DIY approaches: sump construction and/or plumbing, cabinet building, CO_2 systems for planted tanks. Look online to see how others are doing it!

DOSING PUMP/DOSER A pump with a very slow drip, ideal for adding trace elements, other supplements, or replacing evaporated water. The slow drip prevents shocks to the system that can occur with sudden changes, and allows minerals to dissolve more completely.

DSB/RDSB See deep sand bed.

FILTER A filter is anything that cleans water of debris, chemicals or organic waste. Most filters do this by forcing water through porous filter media. A filter may perform one or any combination of mechanical, biological, or chemical filtration; some run continuously; others purify tap water; some are specialized, like diatom filters or protein skimmers.

FILTER FEEDER A filter feeder eats by filtering microorganisms out of the water that passes over and through its body. Filter feeders rely on proper water circulation to get all their nutrients. They include sessile invertebrates and some crustaceans. When filter feeding, you may need to turn off protein skimmers, UV sterilizers and other filtration devices

FILTER MEDIA The actual substance water is pushed through that cleans it; usually kept inside a filter, though it can include things like gravel in the tank. Filter media range widely in type and form. Since it does the actual filtration and is constantly accumulating the things it filters out of your water, good performance relies on replacing or cleaning it as needed. Common mechanical filter media include foam and floss, chemical filter media include activated carbons or ion-exchanging resins, while bacterial filter media is anything that provide good conditions for bacterial colonization, including live rock.

FOAM FRACTIONATION The technical term for how a protein skimmer works.

FLUIDIZED BED A fluidized bed occurs when fine grained particles, like chemical resin filter media or sand, are "suspended" in a chamber by a constant flow of water instead of settling on the ground (hence acting more like a liquid than a solid, or "fluidized"). This makes it an efficient filter, because it increases the surface area of the media and the amount of time it's in contact with water.

FOWLR "Fish only with live rock." Describes a common configuration of saltwater tanks that use a structure built from live rock as the tank's focal point and primary filter. Success relies on a protein skimmer and being able to fit enough live rock to process the tank's bioload (with the exception of nano tanks, which may not need protein skimmers if diligently cleaned).

FRAGGING Another word for coral propagation. "Frags" or fragments are created by cutting or breaking a small piece from a healthy coral; the frag can then be situated in another tank. Captive coral fragging helps maintain the health of the world's natural reefs by decreasing the need for wild harvesting.

FRY Baby fish. Not to be confused with the other kind of fish fry.

FUGE Abbreviation for refugium.

GANG VALVE Commonly used with air pumps, the gang valve allows you to split a single airline output into several. Useful for powering multiple devices with your air pump, like airstones, skimmers, or action decorations.

GAS EXCHANGE Process by which oxygen dissolves into your water and unwanted gases escape; happens primarily at the water's surface and is aided by healthy circulation and surface agitation.

gH "General" or "Total" hardness. Also called dgH (degrees of general hardness). A measure of all dissolved solids in water, including carbonate hardness (kH).

GPH Gallons per hour. The measurement of flow rate mainly associated with pumps and filters, this describes how many gallons per hour a piece of equipment can move through it. Affected by head height, ball valves and sharp turns in plumbing.

HALOGEN Halogen lights are a type of incandescent light with a color spectrum range in the low red-yellows, bad for your aquarium because they will encourage massive algae growth, and also because they tend to run hot.

HEAD HEIGHT The distance of a pump or filter from the highest point it must pump water to. Increasing head height will decrease GPH, and most pumps have a limit on how much head height they can overcome. (Pressurized pumps will be able to handle greater head heights.)

HEATER An inexpensive device that heats your water as it flows past; generally has a built-in thermostat that you control. Essential to maintaining stable water temperature. Heaters are either fully submersible, immersible, or install inside or in-line with your filter.

HERBIVORE Organism that eats only vegetation. Aquatic herbivores usually subsist on algae, aquatic plants, and seaweed.

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HITCHHIKER An organism that sneaks into your tank without your knowledge, usually either on live plants or live rock. Some hitchhikers are a nice bonus, like sponges or coralline algae, but most are pests, like *aiptasia* anemones, brittle stars, or some snails. If unsure of what a hitchhiker is, it's probably best to remove it.

HOB "Hang on the Back", this generally refers to an external power filter.

HYDROMETER Inexpensive device that measures the density of water. Used by aquarists to determine salinity, but lacks the accuracy of a refractometer.

IMMERSIBLE Aquarium equipment described as immersible have parts that must remain above water but parts that can or must run underwater, so they hang over the side or back of your tank.

INCANDESCENT LIGHT Energy inefficient with an inappropriate color aspectrum for aquarium use, incandescent lighting may be cheap, but boosts algae growth and can overheat water. Better suited to reptile tanks.

INTERNAL FILTER Filters operated inside the fish tank. Corner filters, box filters or internal power filters are the main contenders (sponge and under gravel filters are usually just referred to as sponge or undergravel filters). Internal filters offer less surface area than external filters so are usually only adequate for smaller tanks.

INVERTEBRATES Animals without backbones. These include crustaceans and mollusks, two families that comprise an astonishing array of striking wildlife, particularly in the marine environment. Of course, let's not leave out corals, sponges, anemones, starfish and other reef wonders.

IODINE A trace element found in natural sea water. It's removed by protein skimmers, so must be replenished regularly in skimmed tanks (and added when skimmers are off). Important to the growth of corals and crustaceans, particularly to coloration.

KALKWASSER German word that means chalk-water; kalkwasser is water with calcium hydroxide dissolved in it. Adding kalkwasser is the most common way to maintain calcium supersaturation and alkalinity in a marine tank where it is needed by growing corals, mollusks, and coralline algae. Adding with a reactor helps prevent calcium from precipitating, or turning into a solid, before it dissolves in your water. Also called limewater; the same results can be achieved using food grade pickling lime.

Kelvin (K) The Kelvin spectrum measures the "color temperature" of different wavelengths of light. Low values (1000-3000K) describe the red and infrared wavelengths (you don't see these in aquarium lights, because they promote algae growth and don't approximate full spectrum daylight). 5000-7000K is a golden white, appropriate for plants and freshwater tanks. 10,000K is a strong white with a very slight bluish cast, while 20,000K has a stronger blue cast.

KH kH is a measure of dissolved carbonates; the abbreviation comes from the German phrase for carbonate hardness.

KRILL Krill are a type of zooplankton that resemble a microscopic shrimp. They are often used in fish food because of their natural pigment-boosting properties; a heavy diet of krill is the reason flamingos are pink.

LAMINAR CURRENT A current which flows in one direction only, such as the current in a river. Powerheads can be used to recreate this type of movement.

LIFT TUBE A tube that supplies water movement to low-flow filter devices that may not use pumps, like sponge filters or under gravel filters. Lift tubes create large bubbles that move upwards, pulling water up behind them.

LIMEWATER See kalkwasser.

LIVEBEARERS Fish that give birth to live young instead of laying eggs. Livebearers are often quite easy to breed. They are freshwater species, the most well-known being guppies, mollies, platys, and swordtails.

LIVE ROCK Rocks removed from a coral reef with organisms living in them kept intact. Live rock may be natural or seeded (inserted into a reef environment for a few years to accrue life). Live rock forms the structural foundation of a coral reef, and the bacteria & microorganisms living on them form the primary natural biological filter of the reef. It may be home to sponges, small coral polyps, worms, crustaceans, urchins - "hitchhikers" that may or may not be desired. Live rock must be cured before adding it to an aquarium. It is increasingly used as the biological filter in saltwater tanks or sumps because of its stability, easy maintenance, and natural status.

LCS Term used in the hobbyist community for "local chain stores" such as Petco.

LFS Term used in the hobbyist community for "local fish stores" not affiliated with chains.

LPS Large polyp stony corals. These are the most difficult corals to propagate in captivity and are often difficult to keep.

LUMEN Unit that measures visible light. Different light bulbs of the same wattage may have higher lumen output. Efficient lights have a high lumen to watt ratio.

MACROALGAE Large algae with leaves or pods that resemble aquatic plants (as opposed to microalgae, which are mostly pests). Used in algal filters and as a live food for herbivores.

MAGNESIUM Trace element present in the ocean important to the processing of calcium into a calcium carbonate skeleton by corals, crustaceans and mollusks. There's around 1275 ppm of magnesium in natural sea

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water. **MECHANICAL FILTRATION** The physical removal of solid particles from the water, usually by straining water through a porous filter media such as filter floss or foam. Protein skimmers perform mechanical filtration in saltwater using the surface tension of air bubbles. Keeps water clear and protects biological filters from becoming clogged with debris.

METAL HALIDE Metal halide lights are a type of light bulb which burns very white and very bright. They require a special fixture and ballast. They are the closest artificial means of creating sunlight, and are used mainly for photosynthetic reef organisms and light-intensive planted tanks. They produce a beautiful shimmering water effect that characterizes reef tanks.

MULM The proper term for that nasty gunk that accumulates in your substrate. Vacuum or siphon it out during weekly water changes!

NANO A recent trend in the aquarium hobby, "nano" means small and nano tanks usually refer to small saltwater or reef tanks around 20 gallons (the term is loosely applied up to 40 gallons, but 20 is a general consensus). Nano tanks must only stock small specimens that aren't in danger of outgrowing the tank or its filtration capacity. It is more challenging than keeping a larger saltwater tank since conditions shift faster in a smaller water volume, and saltwater organisms are very sensitive to changes in conditions. Nano tanks require frequent testing and water changes at least twice a week.

NITRIFICATION The process by which ammonia is changed to nitrite, then nitrate, and finally nitrogen gas. See nitrogen cycle.

NITRATE NO_3, a product in the nitrogen cycle. It is not toxic at low levels; freshwater fish can tolerate up to about 40ppm (lower is better) before experiencing discomfort. In a saltwater tank it should be kept as low as possible, under 10ppm. There are only a few ways to remove nitrates from water; the most effective is a simple water change, while plants and algae consume some. It is possible, but risky, to convert nitrates into harmless nitrogen (the true end product of the nitrogen cycle) with a deep sand bed.

NITRITE NO_2, the second stage of the nitrogen cycle. It is toxic to most creatures, and should be at undetectable levels when a tank has cycled.

NITROGEN CYCLE The nitrogen cycle is the natural process of decomposition of organic waste. It's different on land and in water, but it happens everywhere and is the process of ammonia conversion into nitrogen gas by bacteria. In an aquarium, decomposed fish poop creates ammonia - highly toxic. Nitrosomonas bacteria process the ammonia into nitrite, also toxic. Nitrobacter bacteria then convert nitrite into nitrate, which is much less harmful and can be controlled with water changes. This is as far as it gets in most tanks, though specialized systems like the deep sand bed break nitrates down to harmless nitrogen, which evaporates.

NSW Natural sea water. Marine conditioners, supplements and salts must be carefully formulated to recreate the mineral and chemical makeup of natural sea water, which contains LOTS of important things.

OMNIVORE Organism that eats both plant and animal matter. The vast majority of aquarium fish are omnivorous.

ORP Oxidation Reduction Potential. See Redox.

OVERFLOW BOX If installing an external reservoir like a sump, you don't plumb directly into your aquarium, but into an "overflow box" situated in your tank. This prevents complete drainage of your tank in case a power failure stops pumps from returning water, or a plumbing malfunction.

OVERSTOCKING A common problem in the hobbyist community, overstocking occurs when you have too many fish for the water volume of your tank, or when the fish you do have create a disproportionately large bioload. An overstocked tank is less likely to recover from changes in water condition and essentially keeps your fish living in a high risk state where a sudden increase to the bioload (overfeeding, death, new fish) could trigger spikes in toxic ammonia. Avoid overstocking - buy a bigger tank and be aware of tankbusters.

OXYGEN All aquatic animals, including fish and invertebrates, need dissolved oxygen in their water to survive. So do the bacteria that perform the crucial task of biological filtration. Maintaining adequate levels of oxygen is extremely important and often overlooked; you can use test kits if you aren't sure, or add an air pump.

OZONE/OZONIZER Ozone (O_3) is an unstable and therefore highly reactive form of oxygen - a natural purifier because of its tendency to "oxidize" everything it touches. It quickly kills bacteria and other unwanted microorganisms, but must be administered properly, using an ozone reactor or ozonizer which controls ozone levels via an ORP monitor. Ozone causes rubber equipment parts in the water to become brittle and break. Too much ozone is harmful to any organism, including you.

PEAT Peat moss is a type of dried moss that you can add to your filter. It softens water/lowers pH by adding acid and is useful in recreating a blackwater habitat.

pH The "power of Hydrogen" - essentially how acidic or alkaline a solution is; one of the most important water conditions to monitor. Some fish need a very specific pH range to live, while many freshwater species can adapt to a range of values as long as they are stable. All organisms are sensitive to pH changes, which should be made very gradually if ever necessary. Regularly testing pH helps

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you catch problems early; pH naturally changes throughout the day, so readings should be done at the same time each time, and results recorded.

PHOSPHATE A chemical compound found in tap water and sometimes present in small amounts in fish food. Algae love phosphates, and phosphates in your water mean you'll probably have to battle algae blooms. There are test kits to detect it and chemical filter media to remove it.

PHOTOSYNTHESIS Process by which plants and certain microorganisms use sunlight to create nutrients. A photosynthetic organism is one that gets most or all of its food this way.

PHYTOPLANKTON A photosynthetic microorganism that is a primary food source for marine filter feeders. Because they photosynthesize, phytoplankton are present in huge numbers during daylight hours, so feed invertebrates phytoplankton during the day and zooplankton at night.

PLANKTON Plankton is a microorganism that abounds in the ocean and is the world's leading food source because of the huge amount and variety of life it sustains. Phytoplankton are photosynthetic, like plants; zooplankton feed on other plankton. Any marine filter feeder's diet consists of both types.

POWER COMPACT (PC) LIGHTING Power compacts are the same compact fluorescent lights that are poised to take over our daily illumination needs when incandescents are finally phased out. They use less energy than regular fluorescent lights but produce more lumens (more intensity, less wattage).

POWER FILTER Technically, any filter that's directly powered by electricity. External power filters hang on the back or side of a tank, while internal power filters are submerged inside. Capable of all three types of filtration (chemical, mechanical, biological).

POWERHEAD A small, submersible pump that creates one strong current. Multiple powerheads can be positioned for multi-directional water movement and if compatible, can be switched on and off strategically by a wavemaker. Used primarily to create currents (if general circulation is the goal, regular water pumps do that more evenly).

PPM "Parts Per Million"; unit for measuring the presence of trace elements or chemicals in a solution.

PREFILTER The pre-filter is any mechanical filter media placed so that water filters through it before it reaches other kinds of filter media. This means that all large particulate debris is stopped before it can affect the efficiency of more sensitive filters that are easily clogged. A prefilter should be rinsed often.

PROPAGATION Propagation in the aquarium involves sessile invertebrates or plants, both of which can be multiplied by trimming small bits off and then resituating those in a different tank. With corals, this is also called fragging.

PROTEIN SKIMMER A unique mechanical filter which uses the surface tension of air bubbles in a tall column of water to attract dissolved organics; these organics - called "skimmate" - are then deposited in a collection cup which must be emptied every couple of days. The taller the skimmer's column, the more effective, and they only work well in salt water. They're powered by an air or water pump.

QUARANTINE TANK Also called a Hospital Tank, a quarantine tank is a smaller secondary tank, cycled and equipped with a sponge filter, a heater, and some decorations or pvc piping. Its purpose is to house fish if they get ill, preventing spread of disease to the rest of the main tank, and eliminating needless medication. It is also used to house new fish for about 8 weeks before adding them to the display tank; new fish often carry disease that could take weeks to manifest. This also helps ease your fish through the stress of transition.

REDOX Redox, or oxidation reduction potential (ORP), is a measure of how easy it is for chemical reactions to take place. This is an indirect indicator of water conditions and biological processes. It's usually only measured when an ozonizer is used, when an ORP monitor can detect and shut off ozone if levels get high.

REFRACTOMETER Device that measures the salinity of water by determining the concentration of one substance dissolved in another. More expensive than a hydrometer, but also more accurate.

REFUGIUM A separate tank or container from your main aquarium that is plumbed to use the same water. Can be external to your aquarium or an internal separated compartment. Often combined with a sump filter. Used to house fragile or wounded organisms, raise fry, or culture live food & macroalgae.

REVERSE OSMOSIS A process for filtering impurities from tap water before drinking or aquarium use. Most commonly used in saltwater tanks where organisms are more sensitive to water conditions; R/O water can also be used if soft water is needed. R/O systems are pricey, filter slowly, and create several gallons of hard water as "waste" for every gallon of filtered water. Waste water can be used in gardens or in hard water tanks. RO/DI systems combine reverse osmosis with deionization, which is even more effective.

RIFT LAKE A lake with unique water conditions due to its position above a geologic "rift" formed when tectonic plates meet, e.g. the San Andreas Fault. (Geology review:

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huge, slowly moving tectonic plates form the surface of the earth's crust.) African cichlids come from rift lakes on that continent.

R/O, RO, RO/DI See reverse osmosis.

REACTOR Device used to add a substance to aquarium water when control is important. Calcium kalkwasser, and carbon dioxide are often added with reactors, because they must be added very slowly to dissolve properly.

SALINITY The measure of dissolved salts in water. Measured by hydrometers and more accurately by refractometers. The temperature of water matters to accurate measurement, so good devices adjust for this.

SCHOOLING Schooling fish are those which naturally travel in groups of the same species. Many aquarium fish are schooling fish, including tetras, barbs, and discus. Schooling fish will display vibrant behavior and cool patterns of movement if you keep them in groups of 5 or more; if kept alone or in too small a group, they could show aggressiveness, shyness or other abnormal behaviors.

SESSILE invertebrates anchor themselves down for life - corals, sponges and anemones are popular examples. Sessile invertebrates may have a mobile stage early in development.

SLIME COAT Most fishes have a layer of "slime" over their delicate scales. The protective slime coat is a fish's first defense against disease causing agents (bacteria, fungus, parasites) and stress, and a healthy slime coat means a fish can recover from traumas quickly. Stress relief products boost your fish's slime coat; avoid handling fish directly so as not to disturb it.

SPECIMEN TANK Fish tank that houses only one species of organism. A better way to showcase a particularly large or aggressive fish.

SPIRULINA Thought of commonly as blue-green algae, spirulina is actually cultured from a strain of cyanobacteria. Though it has recently become a popular health food item, it's been cultured for human consumption for centuries. It contains unusually high levels of proteins, fatty acids and vitamins, and is also a common ingredient in fish food.

SPONGE FILTER A simple filter consisting of a large foam block connected to a lift tube, usually powered by an air pump. Performs mechanical and biological filtration. Its low flow rate makes it ideal for fry tanks or quarantine tanks. Bacteria can quickly colonize a sponge's porous surface, which also collects debris.

SPS Soft polyp stony corals. These are the most prevalent corals on the reef and unlike LPS corals, are fairly easy to keep in an aquarium with today's advances in technology. Can also be safely fragged and traded, reducing strain on natural coral reefs.

SILICATE Sometimes present in tapwater or certain substrates, silicates are nutrients that can create an algae problem, particularly brown algae. They can be tested for and removed with chemical resin media.

STRESS Fish stress is similar to human stress, but more immediately dangerous. Caused when fish are handled, moved, transported in small plastic bags, and added to new tanks...can also be caused by frequent movement around the tank, aggressive tankmates, and not having safe places to hide (one reason decorations are important). Stress makes your fish susceptible to disease and death, so help him through tough times with stress relief products, and by providing hiding places, a calm environment, or using tank dividers to keep hostile fish away.

STRONTIUM A trace element found in sea water that corals, clams, crustaceans and other skeleton-forming organisms need to process calcium correctly.

SUBMERSIBLE Describes a piece of equipment that can be safely used completely underwater. If you have a saltwater tank, make sure it is saltwater safe or the salt will corrode any metal parts.

SUBSTRATE The material used to line the bottom of your aquarium, most commonly sand or gravel. Substrate choice can affect water chemistry and well-being of tank inhabitants; some choices are better suited to saltwater or freshwater habitats.

SUMP A container or tank used as an external reservoir, usually kept under the aquarium (plumbed into an overflow box; it requires a pump to move water back to your tank). Most useful for increasing the water volume in your system (adding stability), sumps often have multiple chambers that can be used to house equipment, wet/dry filter, or keep a refugium.

SURFACE AREA A measure of how much "surface" a substance has - a perfect flat surface has much less surface area than a surface with bumps, ridges or fine grains because of all those extra sides and crevices. Important to consider when choosing tank design (wider tanks have more surface area and therefore better gas exchange) and filter media.

SURGE Water movement that flows in one direction and then in the opposite direction, usually with less force. Created by natural current patterns in the ocean; can be recreated in an aquarium with powerheads.

SYMBIOSIS Symbiotic organisms rely on each other to survive. A striking example is that of zooaxenthellae algae, which live on certain corals and other reef organisms; the algae produces nutrients during photosynthesis that the larger organisms need for crucial stages in growth and development. In return, the zooaxenthellae are protected and sheltered.

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TANKBUSTER Slang term for juvenile fish sold in the aquarium industry that will naturally outgrow most hobbyists' tanks. Sharks and catfish are the most likely culprits - many grow to be over a foot long and need lots of space. Do your research - buying a tankbuster leads to stunted, unhappy fish, and difficulty finding someone to adopt it when it inevitably outgrows you.

TEST KIT Test kits for aquarium use measure the presence of trace elements and chemical compounds in your water. They are often the only way to monitor important water conditions. They come with powder or liquid reagents, or use dip-strips (usually less accurate).

TRACE ELEMENTS Elements present in small amounts in natural fresh or marine water. Organisms get some of these minerals from food, but most of it must come from the water constantly passing through their systems. These must be continually added to your water with additives, supplements, or salts, as they are depleted by filtration and consumption by organisms.

TRICKLE FILTER Another term for wet/dry filtration, describing the process wherein water is slowly trickled over mechanical or biological media. This trickle exposes water to air, adding oxygen. Because nitrifying bacteria need oxygen, this is a superior form of biological filtration. The water may drip from a spray bar or drip plate.

UGF See under gravel filter.

ULTRAVIOLET STERILIZER A lamp that emits UV light only. UV light kills unwanted bacteria and microorganisms. A tempered glass or quartz shield must be used to diffuse harmful wavelengths.

UNDER GRAVEL FILTER One of the oldest filter designs in use. It's basically a perforated plate installed under the gravel of your aquarium. Water is pulled through the gravel, under the plate, and up through lift tubes - so the filtration is done by the gravel itself. While UGFs still have diehard fans, they lose efficiency quickly, are difficult to keep clean, and are detrimental to plants.

VENTURI A specialized valve which creates a jet of bubbles by drawing air into fast moving water. Seen commonly in protein skimmers and aerating water pumps or powerheads.

WATER CLARIFIER A chemical additive that clears up cloudy water created by bacterial blooms or particulate debris. They should not be used as a primary method of keeping your water clear - this should be handled by using appropriate filters, cleaning regularly and doing regular water changes.

WAVE MAKER Device similar to a power strip; when powerheads are plugged in, the wave maker switches them on and off at timed or random intervals to simulate natural ocean waves. Not all powerheads can hold up to a varying electric current, so check with the manufacturer if uncertain.

WET/DRY FILTER A form of filtration which adds oxygen to water as it trickles through media; because oxygen is needed by nitrifying bacteria, the wet/dry filter provides superior biological filtration. Can be found in sumps, some canister filters or rotating "paddle wheel" power filters such as the Bio-wheel.

ZEOLITE A natural, micro-porous ore used as a chemical filter media and also widely used in commercial water purification. Not effective in saltwater.

ZOOPLANKTON Microscopic organism that feeds on other plankton and microorganisms. Zooplankton increase in numbers on the reef at night, so if feeding your organisms phytoplankton and zooplankton separately, feed them phytoplankton during the day and zooplankton at night.

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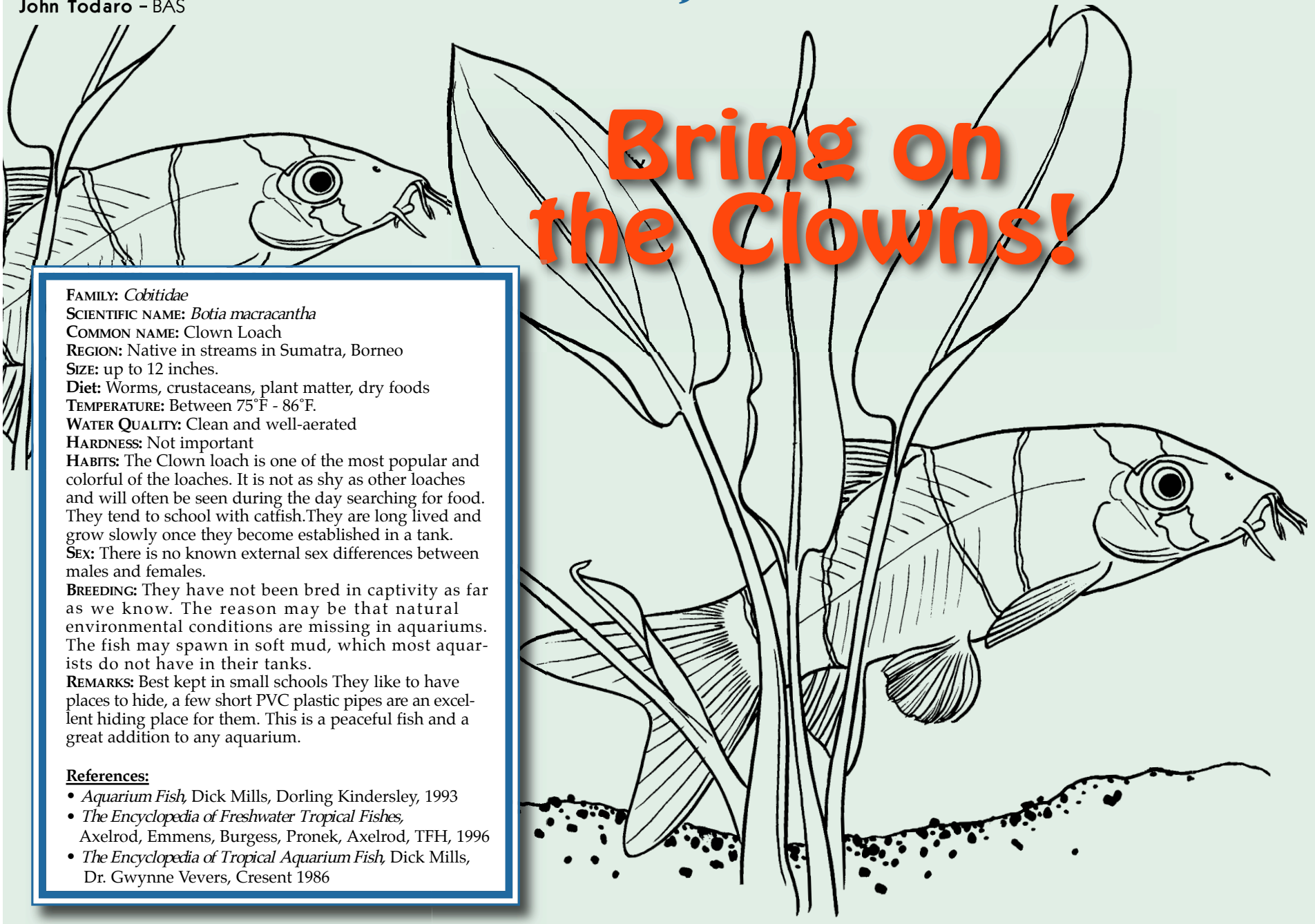
Do you think we missed something? Let us know!

John Todaro – BAS

Bring on the Clowns!



Family: *Cobitidae*
Scientific name: *Botia macracantha*
Common name: Clown Loach
Region: Native in streams in Sumatra, Borneo
Size: up to 12 inches.
Diet: Worms, crustaceans, plant matter, dry foods
Temperature: Between 75°F - 86°F.
Water Quality: Clean and well-aerated
Hardness: Not important
Habits: The Clown loach is one of the most popular and colorful of the loaches. It is not as shy as other loaches and will often be seen during the day searching for food. They tend to school with catfish.They are long lived and grow slowly once they become established in a tank.
Sex: There is no known external sex differences between males and females.
Breeding: They have not been bred in captivity as far as we know. The reason may be that natural environmental conditions are missing in aquariums. The fish may spawn in soft mud, which most aquarists do not have in their tanks.
Remarks: Best kept in small schools They like to have places to hide, a few short PVC plastic pipes are an excellent hiding place for them. This is a peaceful fish and a great addition to any aquarium.

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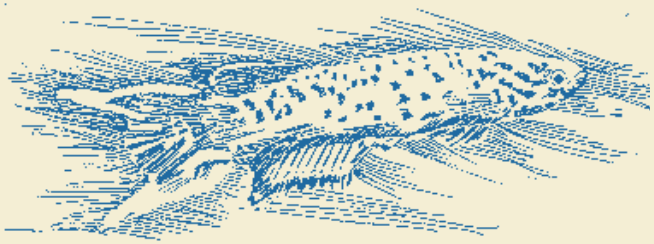
David A. Lass

Species Profile

COMMON NAME:
Blue Lyretail Panchax,
SCIENTIFIC NAME:
Fundulopanchanx gardneri

FAMILY:
Apolcheilidae
(Killifishes)

REGION:
The Nigeria area
SIZE:
2 inches



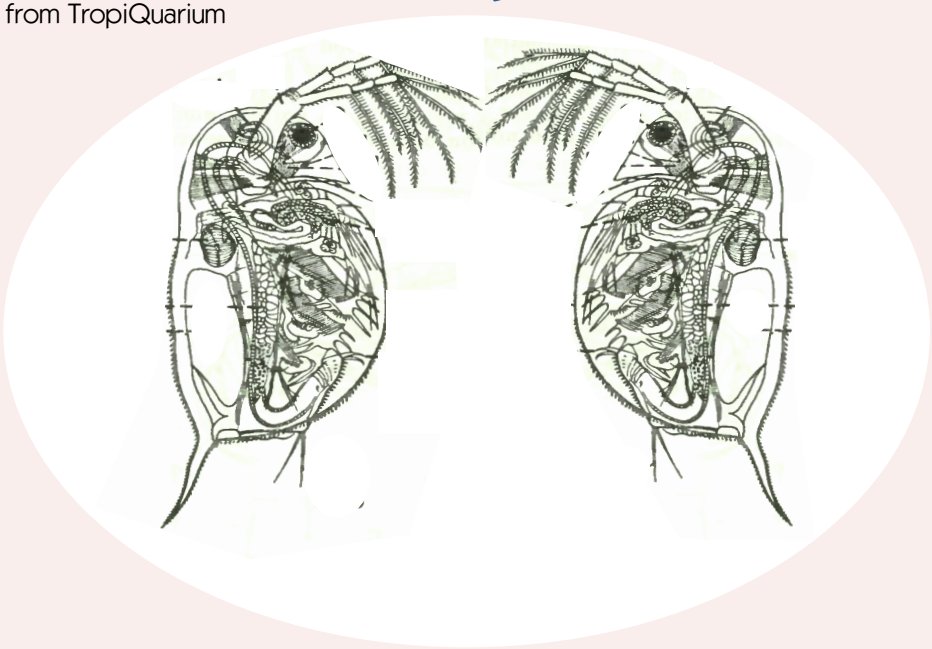
Description: Many variants of this fish are available. Wild fish have a blue body with red specks, with a color pattern going into the tail on males. Males also have borders on the top of unpaired fins.

Tank requirements: This species does well with temperatures of 78˚ to 80˚ degrees Fahrenheit and a pH of 6.0 to 7.0. Soft water is best.
Temperament: As with most killies, *F. gardneri* are best kept in their own tank, paired. They are very secretive and hide most of the time, so you need to provide them with dense plant thickets and subdued lighting.
Feeding: These fish do best with live foods, with live baby brine shrimp being standard fare. They may eventually take some small dried foods, but if you cannot provide brine shrimp or small worms, they usually will take frozen substitutes, and you can then try to get them to eat dry foods.
Availability within the hobby: These are one of the few killifishes that you may actually see in your local fish store, although they are mostly available through specialty breeders. Locate breeders on the Internet or in the advertising pages in fish magazines.

Breeding: Typical bottom-spawning killifish, *F. gardneri* spawn in a layer of peat moss on the bottom of the tank. Eggs must be removed and kept dormant for about six weeks, after which they will hatch. The babies are tiny and need great care in feeding and changing water. They are good killies to start with, as they are one of the easiest killies to find and spawn.

This article is very nice to read, especially since members are always interested in learning about species of fish that they can spawn and keep in their tanks. I have quite a few of these guys in a 55 gallon tank and their tankmates are some a Rainbow fish, Angelfish, Corys and brilliant Rasboras. They are doing very well right now, but I have not tried spawning them just yet. The temperature in my tank is 80˚ degrees and the pH is around 7.0. In terms of food, they are very good eaters in my tank and I use flake foods and some frozen food. A great fish to have for your tank. DL

James K Langhammer – Reprinted from TropiQuarium



Culturing Daphnia With Other Live Foods

The subject "daphnia" is used by aquarists in a very imprecise application and vague questions are asked that verge on "how do you maintain fish"? Many aquarists think all "water fleas" are a species of the genus Daphnia. NOT TRUE! When you collect "plankton" you may get many related crustaceans called cladocerans, which are close relatives of Daphnia, but such plankton collections usually also include ostracods, copepods, insect larvae, fairy shrimp, etc. In order for meaningful communication and comparison to be accomplished, we need to level the playing field. The many "water fleas" have very different requirements from one another and generalizations are not possible.

My comments refer ONLY to the colony commonly referred to as Giant Russian Daphnia (tentatively IDed as *Daphnia magna*) which was brought from Moscow in approximately 1960 by my friend **George Campbell**. I received the colony from George in 1963 and have distributed it widely since then. George used the daphnia to "sweeten" the water in his basement alligator pool and harvested daphnia to feed his fishes.

This colony has for 40 years been consistently propagated under 24-hours of light at approximately 70° degrees F. and has apparently lost its ability to enter a sexual stage and to produce resting eggs when stressed. I have occasionally heard reports that if pond-reared outdoors, it has reverted to resting eggs during the Winter. The fishroom reproduction is accomplished by parthenogenetic females.

This Daphnia and most cladocerans require high levels of dissolved oxygen. Warm water rapidly loses its ability to carry the required level of oxygen as the temp increases. This is why Daphnia and trout and other "cold-water" creatures suffocate at higher temperatures. The Giant Russian Daphnia probably will do poorly or even die out if you cannot keep the colonies YEAR-ROUND well below 80° degrees F. (If you know that will be a problem, try culturing the small Japanese cladoceran *Moina* which is popular with killie-keepers. It can tolerate temps into the 80's, but does not seem to like cooler

Culturing Daphnia With Other Live Foods

waters). The continuing thread through most discussions of Daphnia and live - foods in general is "why bother?" and "I have no space." Quite simply if you do not have room and time in your fish set-up to accommodate something that will benefit your prized fishes, then choices must be made. I strongly urge you to empty fishes out of one or more of your coolest tanks and start cultures of the Giant Russian Daphnia. Your remaining fishes will prosper and you may even find considerable economy involved now that brine shrimp eggs are so pricey.

Once you have opted to make space available, your time becomes important. You will need to treat a HEALTHY, HIGH-PRODUCTIVITY Daphnia culture as "lovingly" as you would your most prized fishes. You frequently see a bucket of green water on a porch or a jar of "daphnia" on a window sill from which an occasional harvest can be secured. By contrast, a good established 20 gallon tank can give you about 1-2 cups of drained Giant Russian Daphnia a week.

The Giant Russian Daphnia can not only be a good source of protein and a stimulant to the natural behavior of predatory fishes, but it can be a great carrier for the color-enhancing carotenoids so important to achieving natural color in tank-raised fishes. Plants are the original sources of pigments such as carotenoids and xanthophylls - but fishes are unable to utilize these coloring agents until the chemistry has been altered - usually by an invertebrate. Insects and crustaceans convert the plant pigments into useable combinations. The Daphnia are fully capable of metabolizing paprika, spirulina, marigold petals, carrot oils and other carotenoid-rich foods into their own bodies so that the Daphnia become "secret" color foods to dazzle your friends by how great your fishes look.

Now comes the work and the reason few aquarists succeed with cladocerans in general. Most aquarists do not give their fishes good husbandry and the Daphnia are far less "forgiving" than the fishes! If you rate yourself as a lazy aquarist, no need reading further.

The Steps to Success:

1. Find a culture of the Giant Russian Daphnia.

2. To an EMPTY aquarium or container (always avoid plastics!), pour in the starter culture as you received it. If the volume is small, tip the tank up so the culture water pools at one end. Beginning immediately and every few hours thereafter, add approximately the same volume of aged water from a For example: if the original culture was a pint, add a pint now, making a quart of culture. Next add a quart, to become a half-gallon, etc. As soon as the water is deep enough, level the tank and add an air-stone for good aeration at ALL times. Daphnia are commonly used as bio-assay organisms in laboratories because they are very sensitive to changes in water properties - chemical toxicity leaching from plastics can kill cultures attempted in garbage cans – but even abrupt temperature or pH shock during water changes can be lethal.
Try to provide a consistent stable physical environment for the colony.

3. Daphnia cultures should have 24 hours of light, so install at least a low wattage bulb above the tank. They are strongly phototropic and quickly swarm to a concentration where the light is brightest. If a darkened fishroom is illuminated slowly by sunrise, for example, the Daphnia will often crowd so densely into a corner or side of a tank near the light source that they smother themselves much as frightened chickens are known to do in a corner of the hen-house. The Daphnias' positive phototropism seems to override the natural tendency to flee from suffocation syndrome. Even with aeration present, the concentrated biomass may suffocate your colony. Thus an overhead, centrally positioned light source is best.

4. As the Daphnia culture grows, you will quickly have a concentration of organisms producing waste products, pheromones, and metabolites that will suppress reproduction and eventually poison the culture.

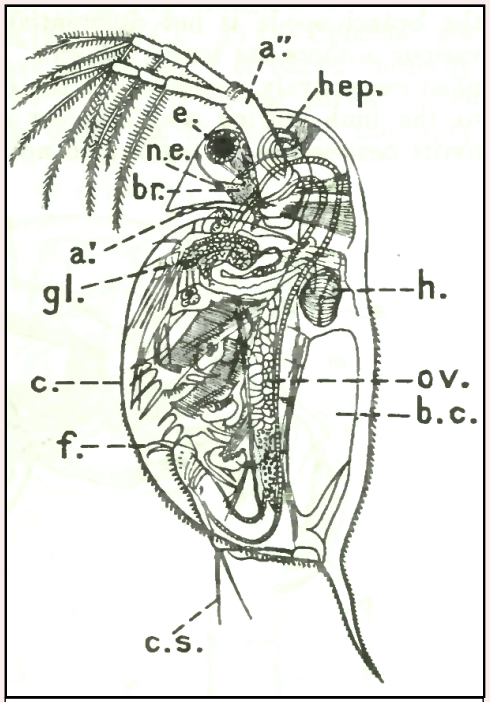
WATER CHANGES ARE AS IMPORTANT TO THE DAPHNIA AS TO ANY FISH YOU KEEP!

I change water on my seven Daphnia tanks - 70% EVERY DAY.

This is not preferential treatment for the Daphnia since I do similar water changes every day on many of my fish tanks which contain high densities of immature fish. How you accomplish these water changes can be left to your own ingenuity. Siphoning the water out from within a "cage" of fine nylon mesh will work. You could also siphon the water into a jar, and then pour the contents through a standard brine shrimp net to harvest any daphnia therein for feeding. I use a very fine-meshed commercial suction strainer. Replenish the culture water from a source of room-temperature water. I have 55-gallon storage units of aged water and automated pumps to facilitate my water changes but those are not requisites to culturing Daphnia.

5. FEEDING KILLS MOST DAPHNIA CULTURES! Daphnia are so sensitive to low-oxygen levels and equally to high-carbon-dioxide levels that feeding too much will often suffocate a colony in just a few hours' time. Most aquarists feed active dry-powdered yeast to daphnia and it can be an excellent permanent diet BUT BEWARE! It is a living culture and a slight pinch too much can result in a "bloom" of yeast that suffocates the Daphnia. Learn to feed yeast a TINY portion at a time until you can accurately estimate how much yeast is consumed in 24 hours. IF YOUR WATER IS EVEN SLIGHTLY MURKY (OPAQUE) AFTER 24 HOURS, DO NOT FEED AGAIN UNTIL THE WATER IS CRYSTAL CLEAR! Few Daphnia cultures starve to death but ALMOST ALL STARTER COLONIES ARE KILLED BY EXCESS FOOD! I usually feed yeast about five days a week and the following cereal formula every three to four days.

6. Most of you will be disinterested in the work load already outlined, but if you want to supplement the Daphnia for color-feeding, once or twice a week add a small amount of the formula to the tank, but NEVER ON THE SAME DAY YOU USED YEAST! Add equal parts of soy flour and whole wheat flour (or better yet, one of the "multiple grain hot-cereal mixes" available in health food stores) to make a cereal base balanced for the amino acids. Buy the reddest paprika you can find and add one part of paprika to nine parts of the cereal base. If you have any spirulina powder, astaxanthin, or other respected coloring enhancers, add a small amount to the formula - and mix it thoroughly. The formula stores well at room temperature, but try not to make supplies too far ahead of usage date.



Daphnia, female. *a'*, antennule; *a''*, antenna; *b.c*, brood-chamber; *br*, brain; margin of carapace; *c.s*, caudal setae; *e*, compound eyes coalesced into one; *f*, furca; *gl*. maxillary gland; *h*. heart; *hep*. hepatic diverticulum of gut; *n.e*. nauplius eye; *ov*, ovary. (After Claus and Grobbeu.)

7. Using the afore-described formula not only enhances the Daphnia's nutritional value, but will allow you to create additional "multi- dimensional" cultures. With the cereal base. I am also able to culture amphipods, copepods, and a "water worm" (*Dero* sp.: family *Naididae, phylum Annelida*), all cohabiting successfully with no additional work for me. The "water worms" form mats across the floor of the culture and give me a disease-free substitute for the popular "black-worms" (*Lumbriculus variegatus*) and the now disfavored tubifex worms (*Tubifex* sp.).

8. Don't try to cut corners! These are my "secrets" - give your Daphnia cultures TLC and they'll give you a resounding return In the successes you see in your fish room.

Good luck!

Izzy Zwerin - BAS

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

The Practical Plant

TWO PLANT PROFILES

1 Propagating: *Anubias congensis:*

***Anubias congensis* is a great plant that you should welcome into your aquarium. This plant is extremely hardy and tolerant of a wide range of water and lighting parameters, as are all *Anubias* species. It is a plant that will also allow for a wide range of artistic possibilities. The *Anubias* are considered rare, and somewhat expensive, because of their extremely slow growth. Despite the slow growth, I have found *A. congensis* to be easy to propagate. It does require more patience than talent.**

The *Anubias* genus is native to tropical West Africa. *Anubias congensis* superficially resembles *A. nana,* but the leaves have a smoother surface. It will, however, reach a maximum size almost three times larger than *A. nana,* but this will take quite some time. The roots will sprout out from the rhizome and wrap around anything you choose to anchor the plant on. The leaves will emerge from the rhizome as well. The leaf blades are described as narrow elliptical. All *Anubias* have tough leathery leaves which are left alone by most herbivores. *Anubias* in nature are not true aquatic plants, as they are only submerged for part of the year. The *Anubias* genus has proved to be highly adaptable and will readily accept a life permanently submerged. They rarely flower in the aquarium. You can grow *A. congensis* in a medium-rich substrate; however, you must not bury the rhizome as this can promote rotting. The rhizome should be weighted in place on top of the substrate until the plant takes root. I prefer instead to grow my Anubias species anchored onto a piece of stone or driftwood. Tie them in place with thread. I usually recommend a 100% cotton thread for attaching plants to driftwood so that the thread will rot away in time. Since *A. congensis* will grow so slowly, I use a polyester thread and cut it away when I am sure that the plant is firmly attached.

My *A. congensis* is being kept in a twenty gallon long until it gets too large. I am using Caribe Sea's "eco-Complete" as a substrate. I have a Whisper 30 hang on power filter. The aquarium is heated to 78°; the GH is about 60 and the pH is 6.8. Since the aquarium is only 12" tall, I chose a fixture made by Coralife called the "Aqualight T-5 double." I would describe the lighting on this aquarium as the "upper" end of moderate, but the plant is known to do well with less light. The system is CO_2 enriched as well. Since the bio-load in this system is fairly heavy, and many of the other plants in this tank are slow growing species as well, I only supplement this aquarium with potassium and trace elements. To propagate this plant, you need to take a rhizome cutting. The rhizome is quite firm and should be cut cleanly. Scissors tend to crush it, so it is best to use a scalpel or single edge razor blade to take the rhizome cutting. I will also remove the roots from the cutting. I need the rhizome cutting to grow new roots so I can attach it to driftwood. Cut the roots off as close to the rhizome as you can without damaging it, and then tie it in place onto your choice of an anchor (stone/driftwood).

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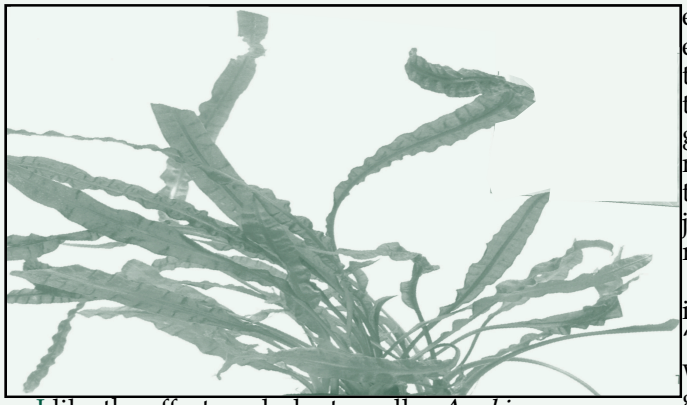
2 Propagating *Cryptocoryne balansea*

***Cryptocoryne balansea* is a great plant. It would look really nice as an addition for taller aquariums as the plant reaches over 18" tall. This plant is extremely hardy and tolerant of a wide range of water and lighting parameters, as are most Crypts. It is, in typical Crypt fashion, slow to get established. Once it gets going, it grows well. It will spread via runners and, given a little time, become quite prolific. The leaves are long strap-like blades with a nice texture on the surface. The leaves are a deep green with a reddish color starting at the base and running all the way up the middle of the leaf.**

Cryptocoryne balansea is native to Thailand and Vietnam. Like most Crypts, this plant is a heavy root feeder and will benefit greatly from the use of substrate fertilizers. My *C. balansea* is being kept in a twenty gallon long so that the leaves start in the back of the tank and arch over to the bottom in the front.



I like the effect, and plant smaller *Anubias* species in its shade. I am using Caribe Sea's "eco-Complete" as the substrate. I have a Whisper 30 hang on power filter. The aquarium is heated to 78˚; the GH is about 60 and the pH is 6.8. Since the aquarium is only 12" tall, I chose a fixture made by Coralife called the "Aqualight T-5 double." I would describe the lighting on this aquarium as the "upper" end of moderate. The system is CO_2 enriched as well. Since the bio-load in this system is fairly heavy, and many of the other plants in this tank are slow growing species as well, I only supplement this aquarium with potassium and trace elements. To propagate *C. balansea,* just separate a plantlet from its runner and replant.

One of the nice things about this plant is that it does not seem to suffer from "Crypt Rot." Crypt rot is a condition where all the leaves rapidly disintegrate. There is considerable debate in plant circles as to the cause of this. I personally believe that this is just how the plant adapts to a new environment. I keep a variety of Crypts and the ones that displayed this phenomenon were not killed by it and eventually re-grew; however, some species took as long as six months to regenerate.

Exchange Editor's Report

The Exchange Editor's job is reading publications from different clubs and suggesting items of interest to our members.

• New Hampshire Aquarium Society, *The Granite-Fisher* Volume 18, Number 9, **Larry Feltz** describes his "self siphoning system that is the "best thing since sliced bread." The Water-In-Water-Out system, as it more appropriately called, makes his and maybe your life easier. You don't have to be a physicist or as **John Todaro** says "a rocket scientist" to figure it out and make it work. And yes it is adaptable to include any improvements you may want to make.

• North Jersey Aquarium Society, *The Reporter,* November 2009. **Chuck Davis**, who lives in South Florida but is still a NJAS diehard, tells us of his trek "Northward" from his place to Tampa Bay for the auction. I have no idea when this occurred since in his haste to talk on paper, he said nothing about the date of the auction. I do know it was a long weekend. And true to the hobbyist spirit, when they left there to return south, they swung off of the Interstate and down local road SR 29 for some more collecting. Now that ain't Brooklyn.

• **Larry Jinks**, in one of his last northern treks (while still a northerner), writes about how he and the fearsome threesome traveled to the Norwalk Aquarium Society's 43rd Annual Aquarium Show. The other two travelers were **Frank Nell** and **Rich Martucci**. Once there, they set up their tanks for the show and the awards. Frank took three firsts, two seconds and one third, including Best Cichlid and Best of Show for his *Copadichromis* sp. 'mloto yellow'. Rich took first and third in female bettas, second in male bettas, second and third in photos and first and Reserve of Show for his Betta pugnax female.

Larry garnered one first, three seconds and two thirds including a sweep of the *Apisto* class.

• In the Aquarium Club of Lancaster County, *TANK TALES,* Vol 38 No. 10, A cute article entitled What is a "Fish Nut" by **Reet Thomas Jr**. (reprinted from "Aquarticles") has several, more like 36, reasons we are all fish nuts, one of which is that you have bought and remember when a 55 gallon aquarium was considered huge.

• Greater Chicago Cichlid Association, *CICHLID CHATTER*, November-December 2009, talks about going Chatter and electronic distribution. That seems the way we are all headed and we all want to GO GREEN too. This must be the time of year for From the Mind of a Fish Geek by **Don Weger.** Do baby fish cry? LOL. GCAA also has scheduled Swap meets for Jan 24 and February 28 and their Auction for April 18. All events are at the Sheraton Hotel in Arlington Heights. If you're in the area, drop in.

•Greater City Aquarium Society – New York, October 2009 *MODERN AQUARIUM*, there is the short story of Buttkis, the 20 pound 41 year old Pacu that has been residing in the same Queens pet shop since 1967. WOW!!!

There is a story titled *My First Favorites* by **Susan Priest,** who goes into detail about Mollies. The species term of *Poecilia latipinna* or velifera and both have different meanings when describing a type of molly. This is worth reading. President and Editor **Dan Radebaugh** reports of his trip to the Cold Spring Harbor Fish Hatchery and Aquarium. He says that it might be worth the trip he can't enthusiastically recommend it for "fish people."

• Diamond State Aquarium Society, Inc.- *The Gravel Gossip* Volume 46 Number 10, December 2009 there is a nice true life story by **Preston Becker** titled Moving With Fish. Not only does he move once, but he has to move into a rental to keep his buyer who is ten weeks earlier than expected.

•Missouri Aquarium Society, Inc. *The Darter*, Nov/Dec 2009 has a nice story by **Gary McIlvaine** titled Spawning *Thorichthys ellioti*. They are easy to breed and with a bag of them bought at the American Cichlid Association convention in Atlanta in 2008, off he went.

If you're interested in reading any of these articles, contact Stu at a meeting or call him at 718-976-1321. There is a small copying fee of 25¢ per page, plus postage if articles are mailed. No postage if you pick up the article at a meeting.

Mike Rosenthal - Reprinted from *Aquatica,* Vol. IX, No. 10, June 95

KILLIFISH Q&A

Q ***Since killifish are exotic fish from the jungles, should the temperature be very high? What temperature is best for killifish?***

A Killifish are distributed worldwide (except the Arctic and Antarctic) and therefore are subject to different temperatures. It is important to know where the species or genus originates in order to maximize their care and propagation. The genus *Nothobranchius* is found in the East African desert which dries out half of the year.(1) This would indicate an arid, hot climate which points to using higher temperature as a controlling parameter. Similarly, *Cynolebias* and *Pterolebias* are found in the South American desert areas.

Diapteron are located in equatorial Africa, which would indicate high temperature. Unfortunately, *Diapteron* must be kept in the mid to low 60's. Many hobbyists have kept *Diapteron* during the winter months only to lose them to the summer heat. The paradox can be explained by noting that the hot African sun is absorbed almost entirely by the canopy of trees, which only allows a fraction of light and heat to filter through, keeping the jungle below quite cool and dark. This is the best way to maintain *Diapteron,* by mimicking their "natural" cooler condition.

(1) Die Gattung *Nothobranchius* - Eine eigeleigungen Zahnkarpen aus Ostafrika Lothar Seegar.

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BD

2010/2011

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

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

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