

# Redfish

Issue #5, November 2011



## Central American cichlids

A quick guide to the major groups!

Tropical



Breed the fearsome Jaguar cichlid

Marine



Garibaldi damselfish: Factfile

Reef



Lighting the Reef tank!

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This month's Eye Candy Contents Page Photos courtesy:

(Top row. Left to Right)  
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'Malawi cichlid' by Crabchick  
'Moray Eel' by Damien du Toit  
'Mr Big' by Aini (-a20-)  
'Frog at the Pond' by Noël Zia Lee

(Bottom row. Left to Right)  
'Bursting with color' by the\_tahoe\_guy  
'Untitled' by Billy Verdin  
'Odessa' by Barry Baps  
'Anemone' by Dan Hershman  
'Guppy' by Tokkes



**General Advice Warning**

The advice contained in this publication is general in nature and has been prepared without understanding your personal situation, experience, setup, livestock and/or environmental conditions.

This general advice is not a substitute for, or equivalent of, advice from a professional aquarist, aquarium retailer or veterinarian.

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# About Redfish

Redfish is a free-to-read magazine  
for fishkeeping enthusiasts.

At Redfish we believe in the free exchange of information to facilitate success by aquarium and pond hobbyists. Each month Redfish Magazine will bring you dedicated sections on tropical, coldwater, marine and ponds.

Redfish was founded in early 2011 by Jessica Drake,  
Nicole Sawyer, Julian Corlet and David Midgley.

We hope you enjoy this, the fifth issue of Redfish.

古池や蛙飛込む水の音  
ふるいけやかわずとびこむみずのおと

## Aqua One Panoramic 11 & 30

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BASICS OF  
**AQUASCAPING**  
BY MEGHAN HELMER

Do you love nature? Have you ever wanted a little piece of lush forest or rolling green hill in your room? With the fascinating hobby of aquascaping it is possible.

Aquascaping is a fairly recent trend in the aquarium hobby that places value on the landscape of the tank. It seeks to go past the artificiality of wacky coloured gravel, plastic plants, and kitschy decorations and instead creates a natural world which both you and your fish can enjoy.

Although adding aquatic plants to aquariums is nothing new to aquarists, aquascaping goes beyond making them an addition, and instead makes them the focal point. In some respects, aquascaping is closer to an art form, like bonsai or flower arranging. While there are no hard rules on how to aquascape, this article will cover a few recommendations for the beginner aquascaper.

First off, you will need some basic aquarium equipment

common to the freshwater aquarium. Clearly you are going to need an aquarium to contain your aquatic garden. The options are almost limitless when it comes to the dimensions of the tank itself. Amazing tanks can be created from the 5 gallon (18.9 litres) range all the way up to and past the 100 gallon (378 litres). Keep in mind, the taller the tank, the more intense the lighting will need to be. Aquarium shape is not necessarily important, but a rectangular tank is traditional, and creates a good “framed” appearance for your natural aquarium.

A heater is necessary, since most aquatic plants are from tropical regions. It is ideal to set the heater to 25 degrees Celsius (77 degrees Fahrenheit), as most plants tolerate this temperature well. It is also a good idea to purchase a thermometer to ensure that the heater is functioning properly.

A filter is essential, since most people will be adding fish into the tank. A filter also increases water circulation which

aids in the dissolving and spreading of nutrients to plants. Most filters will suffice, as long as they are rated to perform properly for the size of your aquarium. However, it is best to avoid under gravel filters as they can be a detriment to planted tanks.

Water testing kits are also a worthwhile purchase, as it is beneficial to keep an eye on parameters such as: PH, ammonia, nitrate, nitrite, phosphate, carbonate and general hardness. Maintaining proper water parameters is essential for creating a successful plant tank. Plants, like fish, can prefer certain ranges of pH and water hardness. Testing the water allows the hobbyist to make adjustments when necessary. Tests can also show the level of nutrients present in the water, which can be a useful guide when fertilizing the tank.

One of the most important components of an aquascaped tank is lighting. Aquatic plants, just like their terrestrial cousins, require light in order to perform photosynthesis. Since there is an impressive range of lighting available, the sheer volume of options can be a real source of frustration for a beginner plant tank enthusiast. Don't get overwhelmed - start by researching the basics. The amount of lighting needed can vary greatly depending on the kind of plants you intend to grow. A good rule of thumb to remember is "watts per gallon" (1 gallon is 3.78 litres). Generally this means 2 to 3 watts of light per gallon of water will be sufficient to grow most aquatic plants. For example, on a 55 gallon (208 litre) tank, the wattage should be somewhere between 110 to 165 watts. This is a simple way to look at lighting in the planted aquarium, and it is worthwhile to

incandescent lights, for example, are some of the cheapest available, and are often found in starter kits. While these can be used to grow some low light plants, they are not without their disadvantages. Incandescent bulbs produce a fair amount of heat and have a shorter life span. Fluorescent lighting, on the other hand, is easily the most common for



*This planted aquascape features a beautiful Red Lotus as an accent and sculptured mounds of Java Moss in the background.*

aquariums and has a range of different options.

Standard fluorescent tubes are a good starting point for a planted tank, however since the available wattage per tube is low, you would need a number of tubes to reach the wattage per gallon recommended. A better choice would be power compact fluorescents as they provide a higher wattage of light for the size of the tube. A newer technology is LED lighting. In the past it was mainly used for moonlights, but savvy hobbyists have started to build their own LED fixtures, and are getting more attention in the aquascaping community. Metal halides are another option. The advantage to these lights is that they produce some of the most intense lighting available, and because of this are often used in marine reef tanks. The disadvantages of metal halides are that they produce significant heat, and are initially expensive. Regardless of which system you choose, you must make sure to change your tubes or bulbs annually, or you will get diminished returns over time.



*This dutch-style aquarium features the hardy and rather beautiful Java Fern. Cardinal Tetras complete the scene! Photo by Ghostsword (Luis Embalo)*

spend the time learning how lights are categorized. Variables such as lumen, kelvin, spectrum, PAR, PUR, lux etc., will affect the growth and vibrancy of the plants.

The kind of lighting can greatly influence plant growth.

gravel. Gravel is only good for anchoring plant roots and is nutritionally devoid, so it will not suffice for anything other than a low tech tank. It is, however, suitable to mix gravel with other substrates.

Try to pick a natural looking colour which will compliment your plants. Try to purchase fine gravel without a lot of sharp edges, to avoid damaging the roots. Since many plants take in nutrients through their roots, it is a good idea to fertilize your substrate. If you want to keep things simple, you should purchase a commercially available plant substrate

If too much of any one nutrient is added, it can result in algae outbreaks. If too little is added, plants will grow poorly or die. Fertilizer comes in two varieties: liquid and dry. Liquid fertilizers are premixed, and often come with a guide for dosing. These are advantageous for a beginner, as no extra calculations are needed. They can, however, be a

disadvantage, as you have less control over the amount of nutrients going into the water column and the cost is significantly higher. Dry fertilizers can be premixed, but often are individually packaged by nutrient. They typically come in powder, but tabs are also available. Some hobbyists choose brands manufactured specifically for aquariums, while others purchase them through hydroponic or gardening stores. It is generally safer to choose a brand manufactured for aquariums, to ensure the contents will not harm any fish



*A low carpeting foreground gives the aquascape depth and allows fish swimming in the foreground to be seen. Photo by Chris Penny*

that contains fertilizer, or opt to add fertilizing tabs underneath the gravel. If you are the adventurous sort, you might want to try making your own substrate. There are a multitude of recipes online, but often they are more work than they are worth, unless you are the patient and experimental type. Whatever you decide, keep in mind that the nutrients in the substrate will need to be replenished when they are used up by the plants.

The most basic planted tank may not need any additional fertilizer, other than fish waste. However, to achieve good growth and healthy looking plants, most tanks will need additional fertilization. As mentioned previously, fertilizer can be present in the substrate, but it is also useful to fertilize the water column as aquatic plants can absorb nutrients through their leaves.

Macronutrients are nutrients that plants need in large amounts. These include nitrogen, phosphate, and potassium. Micronutrients are nutrients that plants need in trace amounts. These include Boron, Calcium, Chloride, Copper, Iron, Magnesium, Manganese, Molybdenum, Sulphur, and Zinc. The amount of these macro and micro nutrients to add can vary depending on the amount of light, carbon dioxide, water quality, and plant type. General guides, like estimated index dosing, can be found online.

present.

The final requirement for a successful planted tank is carbon dioxide. Along with lighting, carbon dioxide is needed by the plants in order to perform photosynthesis. While some carbon dioxide is present in the aquarium, in part due to fish respiration and waste decomposition, the amount is usually insufficient for the level of plant growth in an aquascape. In order to get good, strong growth from most aquatic plants it is worthwhile to consider carbon dioxide injection.

There are a couple of different kinds of carbon dioxide injectors available. If the tank is small (under 113 litres), and you are looking to keep costs to a minimum, a homemade yeast based carbon dioxide injector will work. While there are



*The wide fronds of the Java fern contrast beautifully with the grassy scene being played out in the foreground! Photo by Chris Penny*

commercially available versions, homemade yeast injectors perform just as well and cost far less. Homemade variants

consist of a container (e.g., soft drink bottle) filled with yeast, sugar, and water; and recipes for the mixes are available online. Adding these ingredients together causes fermenta-

a length of silicone tubing, a needle valve, a bubble counter, and a reactor or diffuser. The cylinder contains carbon dioxide gas, which can be purchased from a number of places

such as welding supply stores or home brewing companies. The pressure regulator adjusts the working pressure of the gas to a safe level to inject into the aquarium. The needle valve further adjusts the pressure of the gas, so that it can be injected at a rate of bubbles per minute. The bubble counter is a visual aid which allows you to see how many bubbles per minute are being injected and finally, the reactor or diffuser operates the same as it does in the homemade system; allowing the carbon dioxide bubbles to diffuse before they can reach the surface of the water.

Once you have all your equipment and plants ready to go, the real fun begins. Part of the enjoyment of the planted tank



*Hygrophilia species are used here to fill out the background of this aquarium. Red platys add a splash of red! Photo by Nat Tarbox*

tion, and one of the bi-products of this is carbon dioxide. A small hole is drilled into the container, and tubing is run from the hole and into the aquarium. In order for the aquatic plants to use the carbon dioxide, the gas must diffuse into the water. If the end of the tube was allowed to float freely, the escaping carbon dioxide would bubble to the surface before diffusing. Therefore, a diffuser or reactor must be placed on the end of the tube. Air stones are probably the simplest of diffusers, but you can purchase diffusers and reactors commercially. While the do-it-yourself injector works well for smaller aquariums, and is less expensive, it does not allow for very accurate control of carbon dioxide injection and it may not be adequate for larger tanks.

For larger tanks, a pressurized carbon dioxide injector is ideal. Pressurized carbon dioxide systems have the added benefit of being easier to control, are more consistent, and hold more gas. The disadvantage to these systems is that they can be costly to set up, and there is a greater risk that too much carbon dioxide could be injected into the aquarium in the event that the system is not running correctly.

A basic pressurized carbon dioxide system consists of a cylinder, a pressure regulator,

can be in deciding how to set it up. Some people prefer to draw up a diagram of the aquascape ahead of time in order to plan things out, while others plan as they go. It's easiest to start with a dry tank, placing the substrate down first. It is common to slope the substrate higher in the back, as it creates a more dynamic view of the plants. Wood and rocks are common natural components in a planted tank, and are usually placed next. Although it possible to redo the tank once water is added, it is more difficult, so take the time to consider your set up.



*Great aquascaping looks fantastic from any angle. This photo shows the above tank, front on to great effect! Photo by Nat Tarbox*

When you have the wood and rock ready, you can now add

your plants. Choosing different coloured plants can also make an eye catching display.

It is perfectly fine to place them wherever it appeals to you, but it is common to add smaller plants at the front of the tank and larger ones towards the back. This leads the eye back into the scape, and gives the suggestion of depth. What do you want the focus in the tank to be? Can you angle something differently to make it look more dynamic? Have fun and be creative!



*Mixing leaf textures and colours is important to creating contrasting aquascapes. Thankfully a range of plants are available! Photo by Cheong Kim Tick*

Now carefully add water, plug in your equipment, sit back, and enjoy your masterpiece. Just make sure you don't forget to add fertilizer and change the water when needed! 🌿



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## NEED INSPIRATION?

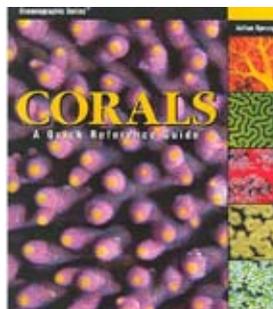
Here are some amazing aquatic images from flickr!

REDFISH MAGAZINE PHOTO CONTEST. OCT 2011 - DEC 2011

Redfish Magazine is pleased to announce the second of its quarterly Aquarium Photo Contests for 2011-2012. Each month we'll publish our favourite reader submitted photos, and in January 2012, we'll announce the winners for this round.

The theme this quarter is:  
"My fish and I"

This quarter we are pleased to be able to offer Julian Sprung's excellent book: Corals: A Quick Reference Guide as a prize!



**CODEWORD: MANAGUENSE**



"One girl in an aquarium" by Antara



"Shark Hat" by Annie Pilon



"pictures at the aquarium"  
by Luis Argerich



### ENTERING THE PHOTO CONTEST

Entering the photo contest is simple.  
Email your name, the codeword, postal address and a high res. version of your photo to [competitions@redfishmagazine.com.au](mailto:competitions@redfishmagazine.com.au).

Please check the rules and regulations prior to entry.  
"Waiting for Separation" by Hamid Najafi.



### RULES AND REGULATIONS

Photo must be your own work. Post processing of your own images is allowed. You must be over 18 years of age to enter the competition.

Detailed rules and regulations are available at:  
[www.redfishmagazine.com.au/competitions/2011\\_photo\\_comp\\_1](http://www.redfishmagazine.com.au/competitions/2011_photo_comp_1)  
"Untitled" by D. Sharon Pruitt.



"koi"  
by Sabotrax

# CENTRAL AMERICAN CICHLIDS

## A QUICK GUIDE TO THE MAJOR GROUPS

Central American cichlids are the black sheep of the cichlid family. For reasons unclear these wonderful fish aren't as popular as their Southern, or East African cousins. When one considers the wealth of colour and majesty of some of the Central American cichlids, it's a hard thing to explain. Here at Redfish we love Centrals and we're going to try and convince you they are worth a look too!

In this quick guide to the major groups, we'll cover the types of array of habitats in which these fascinating fish are found and group similar genera together, as a gentle introduction to these wonderful fish!

### SUMMARY:

#### Group I: Smaller Centrals

The genera *Archocentrus*, *Cryptoheros* & *Amatitlania*

#### Group II: Devils & Midas Cichlids

The genus *Amphilophus*

#### Group III: Texan Cousins

The genus *Herichthys*

#### Group IV: Guapotes

The genera *Parachromis*

#### Group V: Snooks

The genus *Petenia*

#### Group VI: Jack Dempsey

The genus *Rocio*

#### Group VII: The Firemouths

The genus *Thorichthys*

#### Group VIII: Blackbelts & Quetzels

The genera *Paraneetroplus* & *Theraps*



THE ICONIC CONVICT CICHLID. HARDY, EASY TO BREED AND RATHER STRIKING. PHOTO BY BUDI LUKMAN



A FEMALE *HYPHOPHRYS NICARAGUENSIS*.  
PHOTO BY BUDI LUKMAN



*HERICHTHYS ELLIOTII*. SIMPLY AMAZING.

# HABITATS

Unlike East Africa which is host to great cichlid flocks that are endemic to individual lakes, Central American cichlids tend to be more widespread and generalists - occurring in Lakes but also in the streams that feed these water bodies.

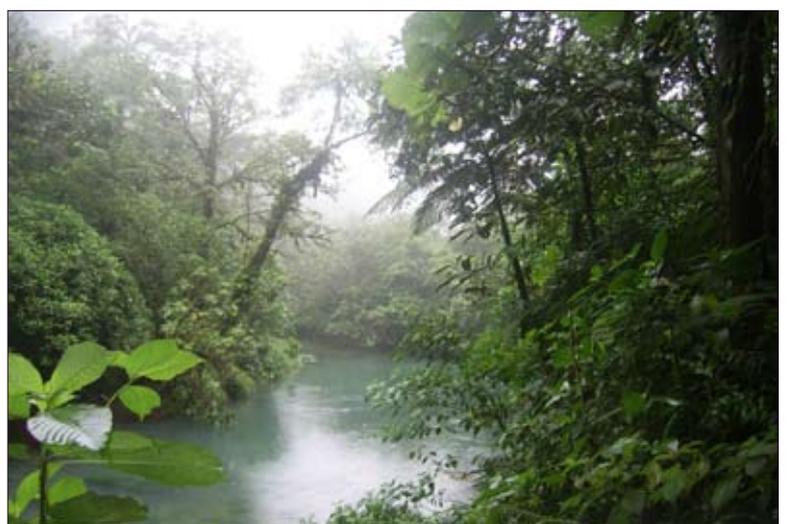
Cichlids occur throughout the isthmus in most fresh and some brackish water habitats. They share this environment with a range of other fishes, most notably for the aquarium enthusiast: livebearing fishes like the guppy and molly. These smaller live bearers are frequently prey species for the cichlids.



MEXICO IS A CICHLID LOVERS PARADISE; THIS IS THE USUMACINTA RIVER AS IT WINDS ITS WAY THROUGH A CANYON IN TABASCO.



EVEN IN TOURIST HOTSPOTS LIKE CANCUN; MAYAN CICHLIDS CAN BE FOUND. PHOTO BY PAUL MANNIX.



RIVERS IN COSTA RICA ARE HOME TO NUMEROUS CICHLIDS. PHOTO BY ESTEBAN CERDAS GOMEZ

CENTRAL AMERICAN CICHLIDS ARE WIDESPREAD, OCCURRING ALONG THE ENTIRE ISTHMUS.

# SMALL CENTRAL AMERICAN CICHLIDS

The genera *Archocentrus*, *Cryptoheros* & *Amatitlania*

## Species:

There's a few species in this group that are commonly available in the hobby. The most frequently encountered are the Convict cichlid (*Amatitlania nigrofasciatus*), Blue-eye cichlid (*Cryptoheros spilurus*), T-Bar cichlid (*Cryptoheros sajica*) and the Rainbow cichlid (*Archocentrus multispinosus*).

## Habitat:

Almost all species in this group inhabit relative slow-moving waters. T-Bars are endemic to the Pacific slope of Costa Rica in the rivers and small streams, but away from rapids. Blue-Eyes are more widespread, occurring on the Atlantic slope from Belize to Costa-Rica in a variety of habitats. Rainbow cichlids have a similar distribution, occurring from Honduras to Costa Rica, through Nicaragua. Convicts are limited in their distribution to El Salvador and Guatemala.

## Size:

Most species in this group are small, reaching under 15 cm (6") in length.



CRYPTOHEROS SAJICA IS A BEAUTIFUL AND RELATIVELY UNCOMMON SPECIES IN THE CICHLID KEEPING HOBBY. WE'RE NOT SURE WHY - JUST LOOK AT THE GREAT COLOURS ON THIS SPECIMEN!

Aquarium care:

The aquarium for most cichlids in this group is straightforward. Like larger cichlids they can be territorial, but this behaviour is largely determined by the size of the aquarium. In aquariums smaller than their territory it's likely that you are going to have problems keeping other fish safe. Conversely, in larger aquariums these fish can be problem free with suitably sized tank mates.

Most species in the group are tolerant of plants and won't destroy vegetation. That said, plants should be well anchored in place using large rounded stones to prevent their roots being damaged by cichlids digging in the substrate.

Breeding most of these little cichlids is straightforward. They tend to spawn in the open, either on flattened rocks or on the vertical faces of rocks. Both parents defend the nest and eggs. Parental care is good and lasts ~20-30 days depending on the size of the aquarium. In larger aquaria, with suitably sized tank mates, parental care can last longer.



FORMERLY IN THE GENUS *HEROTILAPIA*, THE RAINBOW CICHLID (*ARCHOCENTRUS MULTISPINOSUS*) IS COMMONLY AVAILABLE



WHILE NOT GAUDY, THERE'S A SUBTLE BEAUTY TO *CRYPTOHEROS SPILURUS*. THIS SPECIMEN IS COVERED WITH SMALL IRRIDESCENT SPOTS LIKE GOLD DUST.

# DEVILS & MIDAS CICHLIDS

The genus *Amphilophus*

**Species:** There's only two *Amphilophus* species regularly available in the cichlid keeping hobby, namely the Midas/Red Devil cichlids (*Amphilophus citrinellus/labiatus* complex) and the Rose-Breasted cichlid (*A. longimanus*). There are 27 species in total - and amongst specialist cichlid dealers you may be able to obtain other species.

**Habitat:** Both the Midas and the Rose-Breasted cichlid are native to the Atlantic slope of Nicaragua and Costa Rica.

**Size:** Midas cichlids get large, with males reaching 30 cm (12"). Rose-Breasted cichlids by contrast are smaller, reaching only 15 cm (6") or so.

**Aquarium care:** In terms of care the two common *Amphilophus* species could not be more different. The Midas cichlid is known throughout the cichlid keeping hobby as a bellicose species - particularly when kept in small aquariums. Large aquariums are essential if you want to keep Midas cichlids with other fish. The Rose-Breast cichlid, by contrast, is mild mannered and tolerant of other fish species.



MIDAS CICHLIDS HAVE A LOT OF PERSONALITY AND CAN BE GREAT, SINGLE FISH PETS. THEY ARE AGGRESSIVE IN TOO-SMALL AQUARIUMS; BE SURE TO HOUSE THEM WITH SUFFICIENT SPACE.

# TEXAS CICHLIDS

The genus *Herichthys*

**Species:** In the mainstream hobby there's really only one fish that goes by the name of Texas cichlid (*Herichthys carpintis*), and bizarrely that species doesn't occur in Texas. Cichlid enthusiasts sometimes encounter the true Texas cichlid (*Herichthys cyanoguttatum*). There's also a fish being sold as the 'Red Texas', however, this is a hybrid and its keeping is discouraged by most cichlid hobbyists.

**Habitat:** The Texas cichlid is native to Mexico, occurring on the Atlantic slope in the Panuco River drainage, and Rio Soto La Marina. The true Texas cichlid occurs in the Rio Grande in Texas, USA and in northeastern Mexico.

**Size:** Adult males can reach 30 cm (12"). Slightly smaller individuals are typically encountered.

**Aquarium care:** While not as bellicose as the Midas cichlid, Texas cichlids can still be boisterous in the aquarium. They should be kept in suitably sized aquariums with suitably sized tankmates. Larger barbs (such as Spanner Barbs) are good tankmates. If breeding is desired a species aquarium is probably required due to parental aggression while guarding fry. In large enough aquariums, breeding with tankmates is without issue, however, housing such aquariums can be difficult.



TEXAS CICHLIDS ARE MODERATELY TERRITORIAL, THOUGH NOT NEARLY AS AGGRESSIVE AS MIDAS CICHLIDS. THIS IS A YOUNG MALE *HERICHTHYS CARPINITIS*. PHOTO BY BUDI LUKMAN.

# GUAPOTES

The genera *Parachromis*

**Species:** Four of the eight *Parachromis* species are popular in the cichlid keeping hobby. *Parachromis managuense* is without debate the most commonly encountered species in the group and are arguably the most attractive. *Parachromis dovii* (the Wolf Cichlid) along with *P. motaguensis* and *P. friedrichsthalii* are also reasonably frequently encountered.

**Habitat:** The distribution of these riverine cichlids centres around Honduras, Costa Rica and Nicaragua. *P. friedrichsthalii* occurs further north, being found in both Belize and Mexico, but not in Costa Rica. *P. motaguensis* occurs in Guatemala and El Salvador as well as Honduras, but is absent from Nicaragua and Costa Rica.

**Size:** *Parachromis* species are large fish. *P. dovii* can reach 70 cm (28") in length and almost 7 kg (15 lb) in weight. *P. managuense* is smaller, reaching only 55 cm (22") - but it's still a large fish suitable only for reasonably large aquaria.

**Aquarium care:** Beautiful they are, but many of the species in this group are also predators. Therefore, when designing and setting up an aquarium, the size of these magnificent fish and their ruthless behaviour needs to be factored in. Suitable tankmates, in very large aquariums, include larger barbs and larger sized (but peaceful) members of the *Serrasalminae* (Silver dollars and their allies).



THE WOLF CICHLID, *PARACHROMIS DOVII*, IS A PREDATORY SPECIES WHICH CAN BE BELLICOSE. SIMILARLY SIZED FISHES IN LARGE ENOUGH AQUARIUMS TEND TO BE IGNORED; HOWEVER SPACE IS ESSENTIAL.

Breeding can be accomplished by the average aquarist, it is worth remembering that these are large powerful fish with the potential to cause considerable harm to other fish if housed in inadequate sized aquariums. Much of the “crating” and separation of individuals that is undertaken by aquarists is a result of inadequate volume and the inability of smaller individuals (frequently females) to flee a safe distance from the male.

The size of these fish, and their high-protein dietary requirements, dictates that the aquarium should be well filtered. Powerful canister filters, or even trickle filters are recommended for these species. In the aquarium these species are typically bred in pairs.



PARACHROMIS SPECIES OCCUR IN RIVERS AND LAKES, LIKE THIS ONE IN HONDURAS. PHOTO BY ADALBERTO H. VEGA.



THE STRIKINGLY PATTERNED JAGUAR CICHLID IS A BEAUTIFUL FISH, THAT IN THE RIGHT AQUARIUM, IS MAGNIFICENCE EMBODIED.



LAKE NICARAGUA IS HOME TO SOME 16 SPECIES OF CICHLIDS, INCLUDING SEVERAL PARACHROMIS SPP. LIKE THE RIFT LAKES IN AFRICA, THIS CRATER LAKE IS ALKALINE. PHOTO BY PETER ANDERSEN.



photo by Khantipol

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# BAY SNOOKS

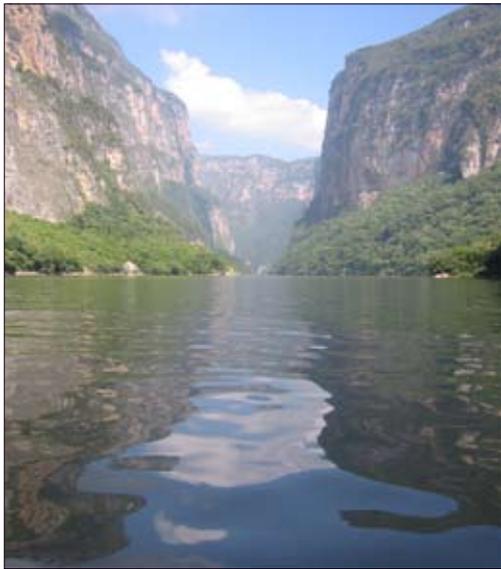
The genus *Petenia*

Species: The genus *Petenia* has three species, though only one: *Petenia splendida*, is ever encountered in the aquarium trade and then only rarely.

Habitat: The species was first collected in Lake Peten, and occurs in rivers and Lakes on the Atlantic slope of Mexico, Belize and Guatemala.

Size: A large species, the Snook grows to 50 cm (20").

Aquarium care: Predatory. Snooks are specialist piscivores. Not typically aggressive with fishes too big to be considered as prey items.



SNOOKS ALSO OCCUR IN THE GRIJALVA RIVER.  
PHOTO BY TJEERD WIERSMA



THE GENUS *PETENIA* IS NAMED AFTER LAKE PETEN, (LAGO PETEN ITZA, GUATEMALA) WHERE IT WAS FIRST COLLECTED.



SNOOKS ARE HIGHLY PREDATORY, BUT NOT VERY TERRITORIAL, FISHES. THESE UNUSUAL CICHLIDS ARE SOMETIMES AVAILABLE IN THE HOBBY. PHOTO BY BUDI LUKMAN.

# JACK DEMPSEYS

The genus *Rocio*

Species: Only one species in the genus *Rocio* (*Rocio octofasciata*) occurs in the hobby with any regularity.

Habitat: The species is fond of drainage ditches, ponds and vegetation choked canals. It is found on the Atlantic slope, from southern Mexico and Belize through Guatemala to Honduras.

Size: Very large individuals can reach 25 cm (10") though most are smaller.

Aquarium care: The Jack Dempsey cichlid is the Ugly Duckling of Central American cichlids. Beautifully patterned as an adult, juveniles tend to be drab and less than eye catching. If you can find good stock, they are excellent Central American cichlids, being smaller sized and (provided large enough accomodation) reasonably tolerant of other fishes.

Notes: The common name of the species is that of the 1920s boxer the species is thought to resemble.



JACK DEMPSEYS OCCUR IN SLOW MOVING, VEGETATION FILLED CANALS LIKE THIS ONE IN GUATEMALA. PHOTO BY SEMIO.



JACK DEMPSEY (1895 - 1983)



FOR THEIR SIZE, JD'S ARE SUPRISINGLY BELLIGERENT. SADLY, JUVENILES DON'T POSSESS THIS AMAZING COLOURATION AND MANY AQUARISTS PASS THEM BY WITHOUT A SECOND THOUGHT.

# FIREMOUTHS

The genus *Thorichthys*

Species: The genus *Thorichthys* contains around 10 species, though only two: *T. meeki* and *T. ellioti* are commonly available.

Habitat: Both species occur in rivers and lagoons. *T. ellioti* is endemic to Mexico, occurring in the Papaloapán drainage, while *T. meeki* is more widespread, occurring in the Usumacinta drainage in southern Mexico, Guatemala and Belize.

Size: *Thorichthys* species are comparatively small, reaching only 15cm (6") or so.

Aquarium care: *Thorichthys* species are relatively gentle Central American cichlids. They are primarily algae eaters, though they will feed on small invertebrates and the like. In the aquarium they are relatively tolerant of tankmates and can be kept with mid-sized barbs and the like without issue. Very small fishes should be avoided. They do nibble at plants, if only to graze the surface, so very soft leaved species should not be mixed with these fish. To breed a pair of these lovely fish, an aquarium of 100 litres (25 gal) is probably sufficient, however, larger aquariums will allow more natural behaviour.



THE CLASSIC FIREMOUTH CICHLID. *THORICHTHYS MEEKI*.



*THORICHTHYS ELLIOTI* IS A TRULY BEAUTIFUL LITTLE CICHLID. LIKE ITS COUSIN THE FIREMOUTH, IT'S REASONABLY TOLERANT OF SIMILAR SIZED FISHES.

# BLACKBELTS & QUETZALS

The genera *Paraneetroplus*, *Theraps* & *Vieja*

**Species:** There are 23 species in this complex group of species. The taxonomy of the group is confusing and under review. Common species available to hobbyists are *Paraneetroplus synspilus* (Quetzals), *P. bifasciatus*, *P. maculicauda* (Blackbelts) and *P. zonatus*.

**Habitat:** *P. synspilus*, *P. bifasciatus* and *P. zonatus* have restricted distributions, occurring south from southern Mexico. In contrast, *P. maculicauda* has a more extensive, and southerly distribution.

**Size:** Most species in this group are large, reaching ~30 cm (12") in length. Most species are high bodied and laterally compressed.

**Aquarium care:** Most species in this group are vegetarians, consuming fruit and leaves of higher plants and algae. For this reason, their aquarium shouldn't include any plants the aquarist doesn't want eaten. They are large fish so require adequate filtration. When not breeding, and housed in adequate quarters, most species are tolerant of tankmates. However, in small aquariums they will display aggressive behaviours towards heterospecifics.



THE BLACKBELT CICHLID OCCURS SOUTH TO THE CHAGRES RIVER IN PANAMA. PHOTO BY JAVIER LOSA



THE SUBTLE BEAUTY OF *PARANEETROPLEUS ZONATUS*

# CLOSING THOUGHTS

In broad terms, most Central American cichlids are similar. Almost without exception they thrive in warm, neutral to slightly alkaline water. Most species are open spawners, who lay their clutches of eggs upon a rock, leaf or into a shallow pit dug in the substrate.

All species practice advanced brood care, carefully guarding and tending their fry for numerous weeks. These similarities aside, as you've seen there's also an amazing wealth of diversity within the cichlids of Central America. There are small, relatively mild-mannered taxa (such as *Thorichthys ellioti* - below) and large majestic predators like the species of genus *Parachromis*.

Central American cichlids are a remarkable group of animals, kept relatively sparingly by fishkeepers. There are, however, hidden gems in this group. Breathtakingly coloured fishes with amazing and interesting behaviours. If you're tired of African cichlids, or are a community aquarist who is looking for a challenge, we're certain there's something in this group of fishes for you. 🌿



A YOUNG PAIR OF THE STUNNINGLY PRETTY *THORICHTHYS ELLIOTI*.

# Community Directory

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## INTERNATIONAL

Advanced Aquarist  
Salty Tank  
American Livebearer Association

<http://www.advancedaquarist.com>  
<http://www.saltytank.com>  
<http://livebearers.org/>

## CANADA

Betta Breeders Canada

<http://www.bettabreederscanada.com/>

### Alberta

Calgary Aquarium Society  
Edmonton Aquarium Club

<http://www.calgaryaquariumsociety.com/>  
<http://www.fish-club.org/>

### British Columbia

Vancouver Aquatic Hobbyist Society  
Wet Coast Aquarium Society

<http://vahs.ca/>  
<http://wetcoastaquariumsociety.ca/wetcoast/>

### Ontario

Brampton Aquarium Club  
Peel Aquarium Club  
Brant Aquarium Society  
Chatham-Kent Aquarium Society  
St. Catharines & Area Aquarium Soc.  
Durham Region Aquarium Society  
Ottawa Valley Aquarium Society  
Hamilton & District Aquarium Society  
Forest City Pond Club  
Kitchener/Waterloo Aquarium Society  
London Aquarium Society  
Sarnia Aquarium Society  
Toronto Willowdale Aquarium Society

<http://www.bac-on.org/>  
<http://www.peelaquariumclub.org/>  
<http://www.brantaquariumsociety.ca/>  
<http://www.cichlidae.com/forum/viewforum.php?f=103>  
<http://www.scaas.info/index.html>  
<http://www.dras.ca/>  
<http://ovas.ca/>  
<http://www3.sympatico.ca/ps.mcfarlane/home.htm>  
<http://www.freewebs.com/fcpc/>  
<http://www.kwas.ca/>  
<http://www.londonaquariasociety.com/>  
<http://www.geocities.com/sarniaaquariumsociety/>  
<http://www.torontoaquarium.org/>

### Manitoba

Aquarium Society of Winnipeg

<http://www.asw.ca/>

### Nova Scotia

East Coast Aquarium Society

<http://www.eastcoastaquariumsociety.ca/forum/>

### Saskatchewan

Saskatoon Aquarium Society  
Regina Aquarium Society

<http://www.saskatoonaquarium.com/>  
<http://www.reginaaquariumsociety.ca/>

### Quebec

Montreal Aquarium Society  
La Societe des Aquariophilie de Montreal  
Ass. Reg. des Aquariophiles de Quebec

<http://www.geocities.com/mtlfishclub/index.html>  
<http://www.aquasam.qc.ca/>  
<http://www.oricom.ca/pierdes/>

## UNITED STATES OF AMERICA

### Alaska

Juneau Aquarium Society

<http://www.taursys.com/kasha/JAS/>

### Arizona

Dry Wash Aquarium Society

<http://www.drywashaquarium.org/>

### California

Bakersfield Koi & Water garden Society  
Desert Fish Club  
Sacramento Aquarium Society  
San Francisco Aquarium Society  
Silicon Valley Aquarium Society  
Santa Clara Valley Koi and Water Garden Club  
San Diego Tropical Fish Society  
Pacific Coast Cichlid Association

<http://www.bakersfieldkoiclub.com/>  
<http://www.desertfishclub.com>  
<http://www.sacramentoaquariumsociety.org/>  
<http://www.sfaquarium.org/>  
<http://www.tactics.com/d/svas/>  
<http://www.sckoi.com/>  
<http://www.geocities.com/sandiegofishfan/>  
<http://www.cichlidworld.com/>

### Colorado

Southern Colorado Aquarium Society  
Colorado Aquarium Society  
Rocky Mountain Cichlid Association

<http://www.southerncoloradoaquariumsociety.com/>  
<http://www.coloradoaquarium.org>  
<http://www.liss.olm.net/rmca/>

### Connecticut

Aqua-Land Aquatic Society  
Exotic Fish Society of Hartford Inc.  
Norwalk Aquarium Society

<http://pages.cthome.net/vito/>  
<http://users.rcn.com/wmercet/>  
<http://www.castaways56.supanet.com/>

### Florida

Gold Coast Aquarium Society South Florida  
Tampa Bay Aquarium Society

<http://www.gcassf.org/Home.htm>  
<http://www.tbas1.com/>

### Georgia

Atlanta Area Aquarium Society

<http://atlantaaquarium.com/>

### Hawaii

Honolulu Aquarium Society

<http://www.geocities.com/Heartland/Meadows/2948/HASF.html>

## Illinois

Champaign Area Fish Exchange <http://www.champaignfish.com/>  
Chicagoland Marine Aquarium Society <http://www.cmas.net/>  
Planted Aquarium Club of Chicago <http://www.pacchicago.org/>  
Tri-County Tropical Fish Society <http://aquariumhobbyist.com/tctfs/index.html>  
Greater Chicago Cichlid Association <http://www.gcca.net>  
Rockford Reefers Aquarium Club <http://www.rockfordreefersaquariumclub.org/>

## Indiana

Circle City Aquarium Club, Inc. <http://www.circlecityaqclub.org>  
Michiana Aquarium Society <http://michianaaquariumsociety.org/>

## Iowa

Eastern Iowa Aquarium Association <http://www.eiaainfo.org/>  
Iowa Aquarium Society <http://www.iowaaquaria.com/>  
Greater Iowa Reef Society <http://www.greateriowareefsociety.org/>

## Kentucky

Greater Louisville Koi & Goldfish Society <http://www.louisvillekoiclub.com/>  
Louisville Marine Aquarium Society <http://www.lmas.org/joomla/>

## Maine

Great Lakes Aquarium Society <http://www.glaquarium.org/>  
Worcester Aquarium Society <http://www.petsforum.com/was/>

## Massachusetts

Boston Aquarium Society <http://www.bostonaquariumsociety.org/>  
Pioneer Valley Aquarium Society <http://www.pvas.net/html/>  
Worcester Aquarium Society <http://www.petsforum.com/was/>

## Michigan

The Aquarium Society of Ann Arbor <http://sitemaker.umich.edu/aquarium.society>  
Grand Valley Aquarium Club <http://www.grandvalleyaquariumclub.org>  
Southwestern Michigan Aquarium Society <http://www.swmas.org/>  
Motor City Aquarium Society <http://home.att.net/%7ec.r.newell/clubs/page2.html>  
Greater Detroit Aquarium Society <http://www.greaterdetroitaquariumsociety.com/>  
Metro Detroit Aquarium Clubs <http://home.att.net/~c.r.newell/clubs/>  
Upp. Peninsula of Michigan Marine Aq. Soc. <http://www.upmmas.com/>  
Marinelife Aquarium Society of Michigan <http://www.masm.org/>

## Minnesota

Minnesota Aquarium Society <http://www.mn-aquarium.org/>  
Red River Valley Aquarium Club <http://www.geocities.com/fmaquarium/>

## Missouri

Missouri Aquarium Society <http://www.missouriaquariumsociety.org/>  
Heart of America Aquarium Society <http://www.kcfishclub.org/>

## New Hampshire

New Hampshire Aquarium Society <http://www.nhaquariumsociety.com/index.htm>

## New Jersey

Jersey Shore Aquarium Society <http://www.jerseyshoreas.org/>  
North Jersey Aquarium Society <http://www.njas.net/>

## New York

Greater City Aquarium Society <http://ourworld.compuserve.com/homepages/greatercity/>  
Brooklyn Aquarium Society <http://www.basny.org/>  
Allegheny River Valley Aquarium Society <http://www.orgsites.com/ny/arvas>  
Long Island Aquarium Society <http://www.liasonline.org>  
Central New York Aquarium Society <http://www.cnyas.org/>  
Nassau County Aquarium Society <http://www.ncasweb.org>  
Danbury Area Aquarium Society <http://northeastcouncil.org/daas/index.html>  
Tropical Fish Club of Erie County <http://tfcec.tripod.com/tfcecwebsite/>

## North Carolina

Raleigh Aquarium Society <http://www.fishclubs.com/nc/ras/main.html>  
Cape Fear Aquarium Society <http://capefearaquariumsociety.com/>

## Ohio

Stark County Aqua Life Enthusiasts <http://www.scalesclub.com/>  
Greater Cincinnati Aquarium Society <http://www.gcas.org/>  
Cleveland Aquarium Society <http://www.clevelandaquariumsociety.org>  
Ohio Cichlid Association <http://www.ohiocichlid.com/>  
Greater Akron Aquarium Society <http://www.gaas-fish.net>  
Medina County Aquarium Society <http://www.geocities.com/MCASfish/>  
Youngstown Area Tropical Fish Society <http://www.yatfs.com/>  
Ashtabula County Aquarium Club <http://www.geocities.com/Heartland/Park/6982/index.html>  
Lorain County Aquarium Society <http://geocities.com/RainForest/Andes/3049/>  
Columbus Area Fish Enthusiasts <http://www.columbusfishclub.org/>

## Oklahoma

Oklahoma Aquarium Association <http://petsforum.com/okcaa/>

## Oregon

Greater Portland Aquarium Society <http://www.gpas.org/>

## **Pennsylvania**

Bucks County Aquarium Society

<http://www.bcasonline.com/>

## **Pennsylvania (cont)**

Delaware County Aquarium Society

<http://www.dcas.us>

International Betta Congress

<http://ibcbettas.com/>

Aquarium Club of Lancaster County

<http://www.aclc.us/>

Northeast Philadelphia Aquarium Society

<http://www.phillyfishclub.com/>

Greater Pittsburgh Aquarium Society, Inc.

<http://www.gpasi.org>

Pittsburgh Marine Aquarium Society

<http://www.pmasi.org/frm/>

Erie Aquarium Society

<http://groups.yahoo.com/group/ErieAquariumSociety/>

## **Rhode Island**

Tropical Fish Society of Rhode Island

<http://www.tfsri.org/>

## **South Carolina**

Myrtle Beach Aquarium Club

<http://www.facebook.com/pages/Myrtle-Beach-Aquarium-Club/402263799688>

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Putnam County Aquaiurm Society

<http://www.pcaquarium.org>

West Tennessee Marine & Reef Aquarium Club

<http://www.wtmrac.com/>

## **Texas**

Federation of Texas Aquarium Societies

<http://www.fotaswebsite.org/>

Capital Aquarium Society of Texas

<http://www.petsforum.com/cas/>

Dallas/Ft. Worth Aquatic Plant Club

<http://www.aquatic-plants.org/>

North Texas Water Garden Society

<http://www.ntwgs.org/>

## **Utah**

Great Salt Lake Aquarium Society

<http://fancyguppy.50megs.com/custom2.html>

Wasatch Marine Aquarium Society

<http://www.utahreefs.com/>

## **Vermont**

Black River Aquarium Society

<http://www.angelfire.com/vt/brasvt/>

## **Virginia**

Potamac Valley Aquarium Society

<http://www.pvas.com/pvasindex.htm>

## **Washington**

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<http://www.facebook.com/pages/Bellingham-Aquarium-Society/112557868810416>

Greater Seattle Aquarium Society

<http://www.gsas.org/>

Kitsap Aquarium Society

<http://www.geocities.com/Petsburgh/5640/kastoc.htm>

Washingon Koi and Water Garden Society

<http://www.washingtonkoi.org/>

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Milwaukee Aquarium Society

<http://fishclubs.com/WI/MAS/>

Green Bay Aquarium Society

<http://www.gbasonline.org/gbashome.htm>

Central Wisconsin Aquarium Society

<http://www.cwas.org/>

## **PUERTO RICO**

Asoci. de Acuaristas de Aguadilla

<http://coqui.metro.inter.edu/acuaristas/aaa.html>

Acuarista Metro Este

<http://www.amepr.org/>

## **BERMUDA**

Bermuda Fry-Angle Aquarium Society

<http://www.fryangle.com/>

## **BRAZIL**

Aquaflux Aquarismo e Aquapaisagismo

<http://www.aquaflux.com.br>

Aqualinea

<http://aqualinea.com.br/blog/>



Photo by Hobvias Sudoneighm

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# BREEDING THE JAGUAR CICHLID

STORY & PHOTOS BY MO DEVLIN



I love big fish. As a kid, I remember my father having a large fish tank in his office. Things always being bigger to a kid, I realize now as an adult that “big” was a 55 gallon tank. Still, he stocked it with a variety of community fish and it was great fun going along as he shopped to stock the tank. At some point he brought home an Oscar (*Astronotus ocellatus*) and I was hooked. From that point forward my interest in the bruisers grew as did my ability to “feed my cichlid addiction”. Today I am a full blown addict maintaining numerous tanks full of large beautiful Central American cichlids.

If you would have asked me a decade ago, which do I like better, keeping them or photographing them, I would have said the former. With the introduction of the digital format I can honestly say that my interests have flipped. I’ve had a camera in my hands for close to forty years covering jobs both civilian and in the military from photographing autopsies to photographing presidents and celebrities as a photo-journalist. It was a great start, leading to my current passion. I love photographing my cichlids. And the digital format has made it increasingly easy to feed my new addiction under the heading “Today in the

Fishroom” on multiple national and international fish forums.

I spend a lot of time just standing in front of my fish tanks observing the behavior that makes them both intriguing and challenging. It’s no secret to those who have kept the larger cichlid species. It’s not always “wine and roses” with a breeding pair. Cichlid aggression is legendary among those in the hobby. And it’s never more intense or interesting as when the couple is in the process of producing fry.

Over the years I have had dozens of *Parachromis managuense* and many pair that have bred. I’ve kept both store bought and also wild caught specimens. A few years ago I was fortunate enough to bring back several Managuense from La Cieba Honduras. While found in several countries in Central and South America, the variant that we brought back from Honduras were especially beautiful, having an intense blue coloration across the top of their back and along the dorsal fin. It’s this pair that has given me hours of pleasure and hundreds of photographs documenting their beauty and behavior.



The pair I have is currently in a 100 gallon tank and kept by themselves. They spawn regularly and predictably, following what I can only describe as being a well rehearsed play. What follows is a description, various “acts” if you will, of the breeding behavior of *Parachromis managuense*.

### ACT ONE – INDIFFERENCE

We have to start somewhere. And like many marriages, there are periods of time when husband and wife are living under the same roof and not much other than just “living” is going on. I’ve found that the reputation for aggression in managuense is only partially true. Like many large guapotes they have their moments when they just simply go crazy. This behavior is unpredictable and generally happens when you least expect it. Often it can result in death or at a minimum a fish that looks like it barely survived a mixed martial art match.

During this period of time I install an incomplete divider with an opening in the egg crate large enough for the female to escape if need be. Managuense, like most of the large guapote are sexually dimorphic, with the female of the species being smaller than the male. The incomplete divider is perfectly suited for this situation. I will note that I have successfully kept breeding managuense in the same tank as other fish, many much smaller and much more docile. The main difference, of course, was they were in a much bigger body of water...a 1600 gallon indoor pond.

Most often the pair will remain on one side of the tank swimming harmoniously with only some occasional spats. The aggression, when it happens, is not always from the larger male. There are times when the female reverses roles and begins to pester the male. When I see this occurring I replace the incomplete divider for one that is complete, keeping momma locked in her room on the other side. This generally leads up to the next part of the play.



### ACT TWO – INTEREST

Depending on what I want to occur, one of two things happens. I either keep the complete divider in place and the pair will breed through the egg crate. Or I remove the divider entirely and let nature take its course. For the sake of this article we will discuss the latter.

As soon as I see the female acting “spunky”, I know that the pair is ready to breed. Generally it’s the female that will begin the courtship. The male continues to feign indifference to her flaring and nudging while the female starts to pay closer attention to their regular breeding area, a flat piece of slate near the front of the tank. With one large water change,

the male seems to do a complete turnaround in attitude and starts to recognize what’s coming next.

### ACT THREE – PREPARING THE NURSERY

Now both parents are on a mission. Over the years I have had fish that have bred in pots, on tank walls, and on rocks. It always starts with both male and female grooming the area in preparation for laying the eggs. In this tank I also have an assortment of driftwood, and silk plants. While the female grooms the slate, the male busies himself with rearranging plants and anything else that doesn’t seem to fit his grand scheme.

Cichlid lip-locking can occur in many instances in the

life of the fish; selection of mate, guarding territory, or in this case, pre-spawning. The instances can last for a couple seconds or in some cases what seems like several minutes. The unique structure of the *Parachromis* jaw with their impressive pseudocanine dentition and large mouths can often result in damage to one or the other fish. I've often stated that



if you are going to show your fish, you can't breed them. The collateral damage, no matter how minor, makes it impossible to keep them pretty.

During breeding, both male and female will jockey for position and dart in to lock onto their mate. While I can't state it as fact, I think the most desirable grip is one on the upper lip of the other... giving new meaning to gaining the upper hand... or lip in this case. Because of the size difference in the two, the male will sometimes get a lucky shot and completely engulf the female's lips in his mouth. Occasionally the female will land a lucky shot and just hang on for the ride. It's big fun for the photographer.

#### ACT FOUR – THE BUSINESS AT HAND

The breeding itself generally takes place within a few days of the above behavior. The female's ovipositor will begin to engorge as will the male's sex in preparation for the next step. What occurs next is nothing short of an aquatic ballet.

Starting at the center of the slate, the female will deposit her sticky eggs moving in small circles. The male follows behind fertilizing the eggs. His job not only this but also to stand watch on the immediate

perimeter as the process continues. This process can go on for up to a couple hours, each taking turns gliding across the breeding area. In the end the entire piece of slate will be filled with very tiny pearls of a future generation of managuense.

#### INTERMISSION

I have often marveled at the sheer volume of fry produced by a single pair of large cichlids. In the wild this fish is often the apex predator in a water shed. And often it's not the only breeding pair of managuense or even large cichlid in the area. So why then the volume? Certainly there's only a certain number of foot long guapote that can actually be supported. The answer of course is natural selection.

The predation rate on the fry must be incredible in the wild. Not only from the other fish, but also from previous spawns from the same pair. As my father often reminded me, and not necessarily about fish but life in general...big fish eat little fish. And in the end, the strongest survive. I've seen older batches of fry eat the fry from a new batch of fish in the tank. Sometimes as much as three generations each snacking on their siblings.

This brings to mind an interesting question. Are we, as hobbyists, doing more harm than good by breeding fish for sale? In the wild only a very small portion



of the original batch of fry will ever make it to adulthood. In our tanks it's not unusual to keep up to 90% of the fry. That means the good, the bad and





the ugly...genes of strong and weak fish thus distributed into the hobby.

There are many discussions regarding the proper care of cichlids in the hobby. Most of it centered on the obvious like nutrition and tank size. Dr. Paul Loiselle once made reference to large guapote that are housed in small tanks as being the “aquaristic equivalent of the infamous tiger cages used to house prisoners during the Vietnam War.”

There's no doubt that any aquatic environment we prepare ourselves would be a poor second to nature itself. The questions that remain; what's in the best interest of the hobby? And what's in the best interest of the fish? Does it matter?

The hobby continues to grow as does the wealth of information available on line on all aspects of fish keeping and fish species. One can only hope that with knowledge comes understanding.

#### ACT FIVE – THE WAITING GAME

With all eggs down, both male and female will take turns gently fanning fins to gently move water across the surface. The female appears to do the majority while the male protects the territory. I have often said that photographing breeding cichlids is the best,

because they are at their prettiest, completely insane and respond to the camera lens like it was an open mouth.

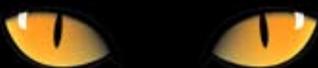
One of the things that I noticed, and it really made me laugh, was how every once in a while the female will take a swipe at the big male on guard. It reminded me very much of the “Don't forget to take out the garbage” that I occasionally will get from my wife. Just keeping him on his toes...or fins...to the task at hand.

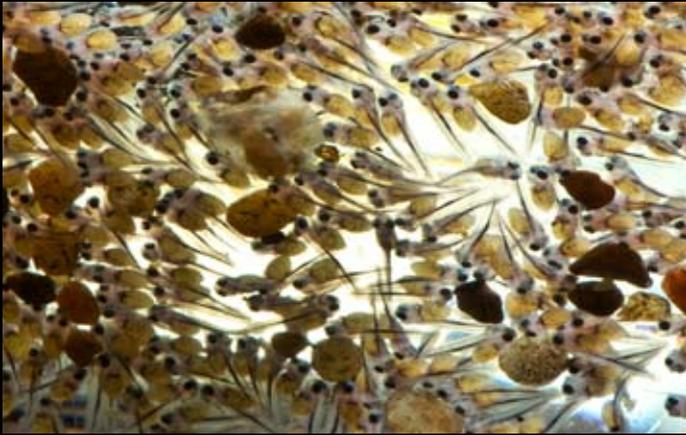
#### ACT SIX – MOVING DAY

At this point it can easily be said that the fry hatch and we're done. But if you slow down the process you can see many amazing and wonderful things happen. Not only in the behavior of the fish, but also the physiological magic that occurs in just under a week.

Once the fry start to move in the tiny pearl eggs, the parents will begin moving them from their “shell” and on to a tiny pile in another part of the tank. This is done methodically and with what would have to be amazing precision. I don't have an exact measurement, but the fry are around a centimeter in size. If you consider the size of a 10” fish's mouth, you can see that it would be like you manipulating in your mouth something the size of a half grain of rice.

All of the “wrigglers” are deposited into a pile; the





parents will continue to scour every nook and cranny of the tank for stragglers. Satisfied, they place tiny pebbles among the fry, I imagine acting as some sort of natural barrier to keep them together. A good friend of mine, David Estes, told me that in the fish farm industry that they are called “yellow bellies” at this point. This is no doubt due to their tiny yolk sac. Once the yolk sac is mostly gone, they’re called “black backers”.

### ACT SEVEN - GROWTH

I had the idea to photograph the babies at this point. The tank with the fish was on an upper rack that enabled me to shoot from the bottom of the tank up to get pictures of the fry. We often take for granted what we can't witness with our eyes. I was nothing short of amazed at watching the progress of the fry as they developed from yellow bellies to black backers.

### ACT SEVEN, SCENE TWO – BLANK SLATE

After two days, all of the fry lie in a pile that from all outward appearances look like a pile of golden silt. From below they resemble tiny tadpoles, with nothing but a hint of features to come, and a predominant yolk sac that feeds their system.

In just 24 hours eye sockets start to appear on virtually all of the fry. Their internal organs are much more visible and you can see the gills starting to develop. None of the fry are moving yet, but you can see most starting a rhythmic vibrating of what will be the dorsal fin. Their yolk sac starts to contour looking more like a beer belly.

Day four and they are starting to look more like the swimming fry. From above the entire mass is vibrating. From below you can see that instead of lying flat, the fish are now catching a little air and are heads down against the tank. Looking at the black orb, you can see the actual formation of the eye.



The mouths are starting to take shape.

On the fifth day almost all are tails up and revving. What used to be a very organized pile from above is now a shifting mass of tiny bodies. Both parents work overtime in collecting and restacking their brood. I also noticed what can only be described as “fish poo” very heavily distributed amongst the pile of fish. At the same time their yolk sacs are getting smaller. I would speculate that they are excreting the contents...possibly the practice run on their waste production system?

Lift off! On day six I did as I had the previous couple of days, getting the camera ready and then turning on the tank lights. It was obvious that today was their maiden voyage by the amount of movement. From above it looks like they are popping off the bottom. After a few minutes, as if on cue, the mass of “black backers” lift off and head for mom.



### ACT EIGHT – CROWD CONTROL

Anyone who's ever had an infant can appreciate that stage where they just start walking and are basically two legs in constant motion. It's a lot of work to keep just one under control. For the managuense parents the job is multiplied several hundred times. Yet more often than not, the cloud of free swimming fry stick together taking subtle cues from the parents on where to be and when.

On occasion one or more fry will stray too far and either mom or dad will gently collect them in their mouth, swim back, and spit them back into the group.



### ACT NINE – FINALE

At first, new fry will feed on the algae of the tank walls. And during the first couple of days will actually have contact feeding off of one of their parents, zipping in to take tiny bites of their slime coat. I don't know why they do this, but would again speculate that it could very well be something of nutritional importance that would help them grow and survive. The first time I noticed this behavior the parents were in a partially divided tank. Both male and female lay on each side of the tank on their side, making what looked like a yawn like snapping motion with their mouths. It appeared at first that they were eating the fry. In fact it was actually a dinner bell. Each time one or the other would perform this; the fry would switch sides and zoom in for a bite of mom or dad. This went on for only a day or two. During this time I continued to provide them with a fry food which I would squirt into their midst with a turkey baster.



thousands of times. One of the highest compliments I have received was from folks who have written me and said, "I got a managuense after I saw that picture of Jumbo." And for me that's what it's all about.

### CURTAIN CALL

Underneath the tank on the stand is a sign that says "Warning, Attack Fish". Without a doubt the interaction you receive from keeping a species like *Parachromis managuense* can easily convert it from fish to wet pet. Not too long ago I had one managuense in particular that I was quite fond of. "Jumbo" lived for thirteen years and was photographed



We all share a common bond with our aquarium hobby. A good friend of mine and Professor of Biology at Lafayette University in Pennsylvania, Dr. Wayne Leibel's, once said at a talk during our annual convention, that while it's the scientists that are out there naming, splitting and lumping the cichlids together...it's the hobbyist like you and I that are sitting in front of the tank observing their behavior. Being able to observe and share what we all enjoy most only serves to keep the hobby more interesting. ❁

# TECHNICAL

## CHOOSING A SUBSTRATE FOR THE REEF AQUARIUM

BY SARA ALLYN MAVINKURVE

PART II - Download part I from Redfish Issue #4.

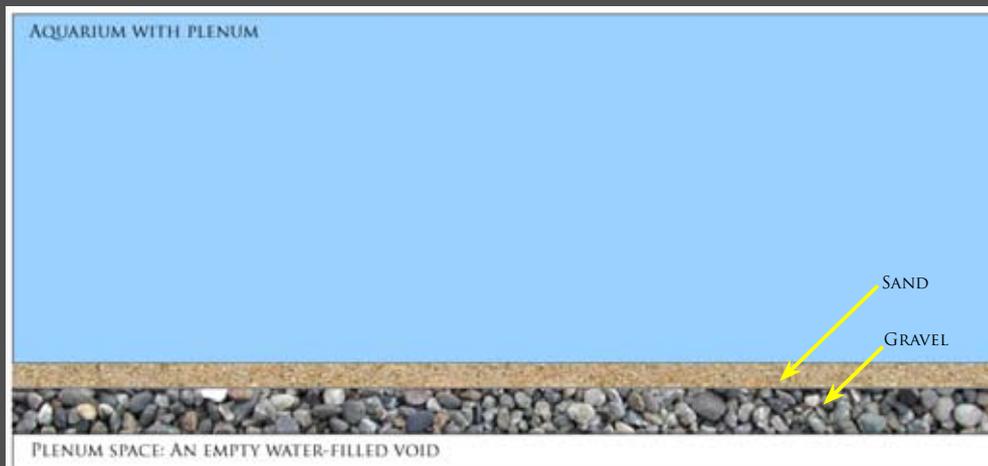
### Advantages to DSBs:

If you have the time and inclination to properly set up and maintain a deep sand bed, this choice of substrate can have a lot of advantages. Firstly, as discussed previously, it can act as an additional source of biological filtration. Again, when set up “correctly,” a DSB will have two zones; an upper aerobic (oxygenated) zone and a lower (oxygen depleted) anaerobic zone. I’ll note here that there are at least a few different theories and methods for setting up a DSB which focus on the deliberate construction of these layers. The Jaubert System is one such method.

In addition to biological filtration, DSBs create a whole other world of niches and micro-environments for marine invertebrates. Many aquarists believe that these organisms are not only fun to watch, but also supply food (either as themselves or with their larvae) to corals and other ornamental marine animals.

### THE JAUBERT SYSTEM

Though arguably not a “DSB” under my previously given definition, I’ll discuss it here since it’s closer to a DSB than it is to any other substrate choice. The Jaubert system was developed by French marine biologist, Professor Jean Jaubert, in the late 1980s, and became popular in the early 1990s. In brief, this is a system with a layer of sand on top of a layer of gravel that is suspended over a thin layer of empty space. This empty space at the bottom of the aquarium, underneath the gravel, is called the “plenum.” In the Jaubert system, two different types of substrate are used to create the aforementioned aerobic and anaerobic zones/layers. Additionally, there’s this “plenum” underneath it all. Therefore, there is water both below and above the substrate. Supposedly and apparently, setting up the substrate in this way reduces hydrogen sulfide production and according to some aquarists, reduces nitrate levels. Though I’ve never attempted to use this method myself, I (and others) have enjoyed theorizing as to what might be going on in these systems. One such theory is that water moves through the layers by way of convection which results from a difference in temperature of the water above and below the substrate layers. If the water on one side of the substrate layers is warmer or cooler than the plenum, convection will create a very subtle, steady “flow” through the substrate layers. This flow could possibly create the gas exchange needed to allow hydrogen sulfide, when/if produced, to exit the system more easily. Or, if the gas exchange is significant enough, it might decrease the size and number of available anaerobic areas in which hydrogen sulfide production could occur. However, this writer wonders, if the Jaubert system creates fewer anaerobic areas, how could it accomplish just as much denitrification (which also requires an anaerobic environment)? Perhaps the reactions resulting in hydrogen sulfide production are more sensitive to the presence of oxygen than are the desired denitrification reactions. If this is the case, then having a hypoxic environment that’s not quite completely anaerobic might allow for all the same nitrate reduction while limiting hydrogen sulfide production. However, I dare not delve too far into any detailed discussion of



Jaubert systems as this has already been done by writers far more experienced with them than myself. There has even been some dabbling into controlled experiments aimed at comparing the Jaubert system to “traditional” DSBs and other methods (see list of references at conclusion of this article). Thus, I refer anyone wishing to know more about Jaubert systems to articles written by Dr. Toonen and others.

There has even been some dabbling into controlled experiments aimed at comparing the Jaubert system to “traditional” DSBs and other methods (see list of references at conclusion of this article). Thus, I refer anyone wishing to know more about Jaubert systems to articles written by Dr. Toonen and others.

## Disadvantages:

DSBs require maintenance in that, in order to function properly, they need to have sufficient populations of benthic life (both seen and unseen). This can be accomplished in several different ways. The best, cheapest and easiest way is to simply swipe some sand from the healthy, well-populated DSB of a fellow aquarist. A measuring cup or two should be enough to get things going in your own sand. The next best way is to order live sand online or see if your LFS sells live sand or “seeder sand.” Unfortunately, just doing this once is not enough. Over time, the diversity of your sand bed is sure to decline as some organisms out compete others into “extinction” from your aquarium. Thus, it’s very important to occasionally repopulate your sand bed. If not properly maintained, a DSB will become at best useless and at worst, clumps of “cement” interspersed with black, iron sulfide coated sand.

**WARNING: Do not put any carnivorous echinoderms in your DSB. These include the commonly sold “sand sifting stars” which people mistakenly believe benefit the sand bed by stirring the sand. To the contrary, these star fish are rapacious consumers of micro crustaceans and other benthic organisms.**

The other disadvantage of DSBs is that it can be challenging to achieve a high level of water flow without creating “sand storms.” As previously mentioned, these sand storms can be detrimental to corals. Also, the sand bed needs to be undisturbed by any such blunt forces (otherwise, the anaerobic zone will not form).

## SHALLOW SAND BED

This will be brief. Shallow sand beds (sand beds < three inches in depth) have very few advantages. They might add something aesthetically to a tank. They might also add some additional niches for life. They likely provide some marginal biological filtration and denitrification. However, the disadvantages will almost always outweigh the minute advantages (especially in a reef tank where you’ll have to contend with “fly away” sand storms). You can’t easily vacuum a shallow sand bed during water changes. And without the organisms of a DSB to process debris, the substrate essentially becomes a trap for fish wash, uneaten food, etc. Thus, by and large, in my opinion, a shallow sand bed is almost always a poor choice unless it’s a mere 1/4in of sand used for aesthetic purposes in a nano tank less than 15 gal. While shallow sand beds have all the same disadvantages as DSBs, shallow sand beds don’t have the depth necessary to harbor the life required to make it a significant source of filtration or place for debris to be processed. If you’re going to go with sand and if your aquarium is 40 gal or larger, I say add the extra inch or two and make it a DSB. Even if the aquarium is <40 gal, you might consider a remote DSB in a larger refugium rather than have a shallow sand bed in the display.

## CRUSHED CORAL

Unlike sand, crushed coral (and similar gravel-sized substrates) can be vacuumed during water changes. Consequently, it’s relatively low maintenance. However, this feature of crushed coral becomes less of an advantage and more of a burden the larger the aquarium size. In large aquariums, it could take hours to vacuum all the crushed coral. Vacuuming also disrupts any potential the substrate might have to create niches for micro marine life. In siphoning out debris, you’re going to siphon out a lot of the worms and micro crustaceans as well. For these reasons, crushed coral is probably most advantageous when used in fish-only systems under 50 gal.

## REMOTE DEEP SAND BEDS (BEST OF ALL WORLDS?)

Remote DSBs are DSBs that are not in the display tank, but instead in an attached refugium, sump or other vessel. Just about any water-holding container will suffice. The nice thing about remote DSBs is that, by keeping the DSB out of the display, it’s easier to have strong water flow in the main/display tank. A remote DSB is also less likely to be disturbed by fish or yourself. The only notable potential functional downside is that some aquarists aren’t sure if a remote DSB has the same potential to provide food to corals as does a DSB in closer proximity to the animals to be fed. Otherwise, if you find yourself torn between sand verses no sand, I highly recommend a well lit remote DSB/refugium. Personally, as someone who loves marine invertebrates, I like to use the remote sand bed in a refugium as a second display. If you add a light (as you probably should) you can grow macro algae above the sand bed for even more nutrient export.

## CONCLUSION

At the conclusion of this article, I hope I’ve at least provided you with the questions you need to ask yourself before choosing an aquarium substrate. As with any decision we must make in life, the most important thing to know is yourself; your abilities, desires, resources, etc. Once you’re familiar with these and all the basic information provided here, the right choice for you and your system should be easy (or at least easier) to make. ❁

**SOME REFERENCES AND FURTHER READING:**

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Sara Allyn Mavinkurve is a WetWebMedia crew member who has authored a range of articles on corals and marine aquariums for international and US fishkeeping magazines. She’s a special guest at the Marine Aquariums of South Africa. When she’s not writing about fish, Sara is an attorney who SCUBA dives in her ever-shrinking amounts of free-time.

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# the Garibaldi damselfish

**Species:** the Garibaldi is the sole representative of the genus *Hypsypops*. Its species name *H. rubicundus* refers to its red colouration. Its common name, however, is derived from the Italian military commander and politician Giuseppe Garibaldi whose trademark clothing consisted of a bright red shirt.



the freshwater central american Midas/Red devil cichlid bears a striking resemblance to the Garibaldi.

through southern Baja California. In this environment it is found on rocky shores sometimes in association with kelp. Individuals generally live in a home territory that they defend from conspecifics.



Giuseppe Garibaldi (1807-1822)

**Description:** the Garibaldi is a large, brightly coloured orange fish that bears a striking resemblance to the Central American Midas/Red devil cichlid which hails from freshwater.

**Habitat:** the Garibaldi hails from temperate waters on the USA and Mexican Pacific coast where it is found from Monterey Bay



**Size & lifespan:** the species is one of the largest damsel fish, growing to 30cm (12") in length. It's also a long-lived species, individuals have been known to live for up to a quarter of a century.

**Diet:** in the wild the species eats mainly small sessile invertebrates that are attached to rocks in its habitat. The Garibaldi is a generalist and its diet can include small polyps, pieces of sponge, algae and other material.



**a group of Garibaldis in the wild.**

**Aquarium care:** like most damselfish, the Garibaldi's care is relatively straightforward. There are, however, some aspects of the species that require a little extra thought.

The first and probably most important is that these are temperate to sub-tropical fish and not strictly speaking tropical. The

water in which they are found (at least in the USA) can get down to 12°C (53°F). Individuals should therefore be carefully sourced with a view to knowing more about their original environment. If they are from a more sub-tropical region care should be taken with their acclimatisation to best match the conditions in their natural environment. Chillers are probably a good idea in most warmer environments to ensure that the water is kept in the adequate range.

Sourcing smaller specimens is a better idea, this allows them to grow into their environment (your aquarium). They are also typically less fussy and in better health. Like all reef species, even those in temperate areas, water movement and oxygenation are important. So be sure to include plenty of wave action in your set up. Given their size they need adequate swimming space (> 400 litres, > 100 gal). Smaller reef setups are therefore unsuitable. Think large angelfish and you're in the right mental space.

Garibaldi like many damsels are territorial, but not psychopathic like Dominos. Despite this, one Garibaldi per aquarium is probably enough.

**Conclusion:** the Garibaldi is an amazing fish that's full of personality. If you're looking to try your hand with something different, then this brightly coloured fish may be just what you are looking for! 🌿



# ILLUMINATION

by Sara Allyn MavinKurve

Lighting is potentially one of the most complicated and intellectually challenging topics in reef aquarium keeping. It requires not only a basic understanding of the physics of light itself, but also a basic understanding of how photosynthesis goes on in the ocean. I know that after reading this two-part article you'll at least feel comfortable with all the lighting "buzz words" like PAR and lux and lumens. More importantly, I hope you'll feel vastly more informed about what the different aquarium lighting options have to offer and which might be best for you.

The three properties of any given light source which are most important to an aquarist are intensity and wavelength spectrum. This I will discuss here in Part I of this article. In Part I, I'll also discuss some of the important properties of the lighting system producing that light, such as efficiency, heat production, longevity, ease-of-use, durability and aesthetics of design. In Part II, I'll discuss the pros and cons of the different types of aquarium lighting systems, such as metal halide lighting, the varieties of fluorescent lighting, and different kinds of LED lighting.

## THE LIGHT ITSELF

### *Watt*

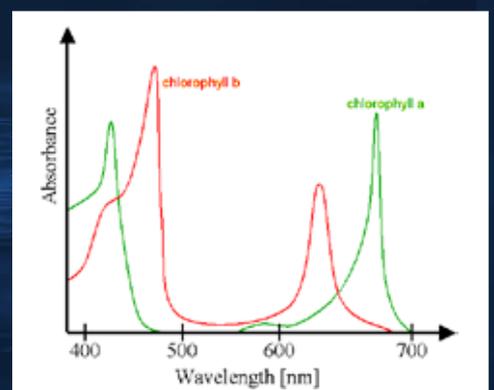
One of the most archaic and misguided "rules of thumb" in the reef aquarium hobby is the instructions to aquarists that their lighting needs can be discussed in terms of "watts per gallon." A watt is a unit of power, a unit of energy per rate of time (specifically, joules per second). Wattage, by itself, has nothing to do with light. Fortunately, the aquarium community has started to become more aware of the folly of the "watts per gallon" rules as more and more efficient lighting systems come out (producing more light at lower wattages). About the only thing you can assume, when it comes to watts, is that all things being equal, the higher watt lighting system will produce more light than the same system set to run at a lower wattage.

However, it's very rarely the case that all else is actually equal. For example, it's probably safe to assume that a 250 watt double ended HQI metal halide lighting bulb and ballast system will produce more light than the same system set to run at 150 watts. Then again, some people like to run 150 bulbs on 250 watt ballasts (a practice called "overdriving"). In any event, you can only estimate light output based on wattage within the context of a specific lighting system. Having so many "watts per gallon" doesn't, by itself, mean anything. Moreover, there's even more to understanding aquarium lighting than knowing the light output of any given lighting system. (More on that later.)



### *PAR (Photosynthetically Active Radiation)*

What is PAR? If you understand that light is, technically, a form of radiation, then the name (Photosynthetically Active Radiation) says it all. PAR is the kind of light used in photosynthesis. Visible light (the light by which we see) consists of light wavelengths between 380nm and 740nm. PAR wavelength ranges approximately 400nm and 700nm. However, light within the range of 450nm to 470nm is probably the most useful to corals. Also, light of short wavelengths is more powerful and more penetrating (in other words, it reaches greater depths). This is why, if you've ever gone scuba diving, once



you reach a certain depth, everything starts to look blue as all the other light of longer wavelengths is essentially filtered out the farther down you go. Ironically, although lights producing more blue (or more “actinic”) light are often considered more aesthetically pleasing, it’s actually harder for the human eye to see things under this kind of light. In any event, if you want to keep corals with high light demands, you’ll want to keep this question of PAR in mind.

## Lumens

A lumen is a unit used to measure the amount of visible light produced by a light source. The inception of the “lumen” dates back to the days when people still read by candle light. One lumen is roughly equivalent to the light emitted from one common candle focused onto one steradian. A steradian is more or less a measure of space onto which the light is emitted. (Well that’s sorta what it is -- but in the interest of preventing migraines, let’s just leave that alone.)

Simply put, “lumens” is how much visible light a light source produces. An ordinary 40 watt incandescent light bulb probably produces roughly 450 lumens. However, an energy efficient 15 watt compact fluorescent lamp (those twisted up bulbs that look like a knotted up T5 bulb) can emit almost 1000 lumens. Metal halide light fixtures can produce anywhere from 60 to 120 lumens per watt. Here again is a good example of why the “watts per gallon” rules are useless. However, if you know how many lumens per watt your light produces, then we might be getting somewhere.

So how many lumens of light come down over a natural reef? Believe it or not, direct full sunlight (such as on the equator at noon on a clear day) is approximately 130,000 lumens per square meter. On a cloudy day in Cleveland, Ohio, USA, it’s probably more like 5,000 lumens per square meter (on a sunny day \*sigh\*). I’m sure you’ve noticed that I’m now talking about lumens per square meter. And that brings me to our next lighting buzz word, “lux.”

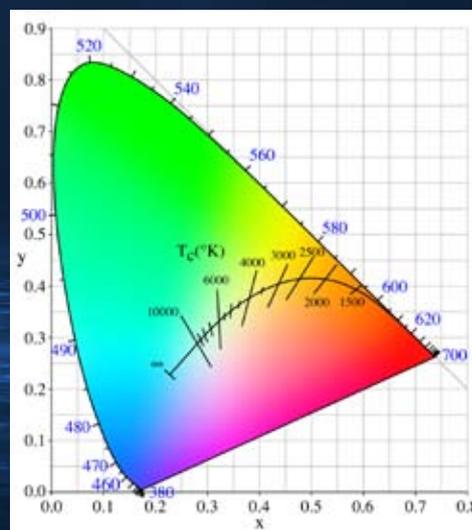
## Lux

Lux is lumens per square meter. And just in case it’s not already obvious, lux is measured with a lux meter. The truth of the matter is that we’re never going to get 100,000 lux over our aquariums. I suppose theoretically we could, but we probably wouldn’t want to (due to concerns for electricity bills, boiling aquarium fish, blinding the neighbors, etc.). Fortunately, it’s been proven that even the most light demanding corals can thrive under far fewer lux. I wish I could tell you how many lux one should have over a reef aquarium, but I can’t. Lux is simply a measure of light/area. It doesn’t tell us anything about PAR, or, more specifically, the amount of light falling within that key spectrum of 450 nm to 470 nm. And that, my friends, is why we now have to talk about K ratings.

## K (Kelvin)

K is a measure of a light’s “color temperature.” The higher the K value is for a particular light/lamp, the cooler the temperature; the cooler the temperature, the bluer the light. As with most lighting terminology, the full extent of the implications of a light’s K value is not quite so simple. We oversimplify it in our minds so that we don’t get so frustrated and overwhelmed we start drinking skim-mate martinis.

Natural sunlight usually ranges from 6,000 to 6,500K. Desired aquarium lighting is usually 10,000 to 20,000K. Considering all I’ve told you about the importance of bluer light, you might wonder why we don’t all use 20,000K lamps. Well, there’s a trade off when it comes to using higher K lamps. For one thing, cooler light has a higher energy (shorter wave lengths) and thus takes more energy to produce. Also, as mentioned previously, it’s harder for the



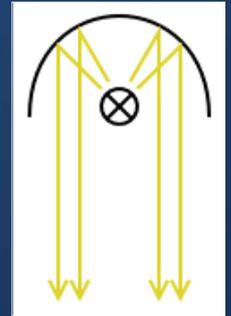
human eye to see this kind of light. Looking at a coral under a 20,000K bulb might, in some ways, appear “prettier,” but it won’t be as easy to see (in terms of observing the details of it).

Don’t be fooled by any lamp/bulb labeled with the term “actinic.” Some of these bulbs produce a light spectrum peaking at 420nm (or otherwise don’t produce light primarily in the desired spectrum). Not all “blue” light is the same. When you go about choosing a bulb/lamp, look for a spectrum chart that tells you exactly what kind of light it’s producing.

## FACTORS AFFECTING LIGHT

### *Reflectors*

The importance of a good reflector is often overlooked by aquarists. Most types of aquarium lighting involve a lamp which is bulbous or tubular in shape. The light emitted goes in all directions. It’s the reflectors job to make sure that light goes down into the tank. Reflectors can be rated by the percent of light reflected in whatever direction it’s pointed. Quality reflectors are usually made out of aluminum or mylar.



### *Distance/Depth*

Of course, the farther up over the aquarium your light source is, the less light will reach your corals. Light travels better through air than it does through water, but some of it will still be lost going from your lamp to the surface of the aquarium water. Unfortunately, the water’s surface is also a natural reflector and so some light will be lost there as well.

Though I’m not sure if it’s ever been tested, it stands to reason that a light-colored aquarium bottom might reflect a certain amount of light back up. I’d be willing to wager that corals in an aquarium with a bottom layer of light-colored (off-white) sand, get more light than those with a darker colored substrate (or bare bottom).

### *Obstructions*

Another very important, and sometimes overlooked, factor in how much light reaches your corals is the clarity of the aquarium water. Cloudy water doesn’t always, by itself, indicate poor water quality. And small deviations from perfect water clarity aren’t always obvious. However, just about any level of particulate matter in your water column is going to block the light (potentially a lot of the light) getting to your corals. To see just how clear your water is, try the white paper test. Take a piece of white printer paper and tape it to the back of your aquarium, with half of it behind the aquarium and the other half extending out past the aquarium. Then step back and look at it, comparing the side behind the aquarium to the side extending past it. It’s not a fool-proof test, but if the two are more than just slightly different shades of white, you might want to consider your water clarity and if it can be improved.

To improve water clarity, start with a good protein skimmer and activated carbon filtration. If you have already used those and still want clearer water, diatom power (used in a canister filter with the appropriate micron filter, or in a specifically designed diatom filter) can turn just about any water crystal clear in less than a few hours.

The theme of this article, and the take home message I’d like to impart, is that there’s a lot more to lighting your aquarium than just watts per gallon and metal halide vs. fluorescent. That said, stay tuned for Part II of this article where I plan to go through the pros and cons of the different types of aquarium lighting systems, such as metal halide lighting, the varieties of fluorescent lighting, and different kinds of LED lighting. ❁

# Redfish

Issue #5, November 2011



## Central American cichlids

A quick guide to the major groups!



Tropical

Breed the fearsome Jaguar cichlid



Marine

Garibaldi damselfish: Factfile



Reef

Lighting the Reef tank!

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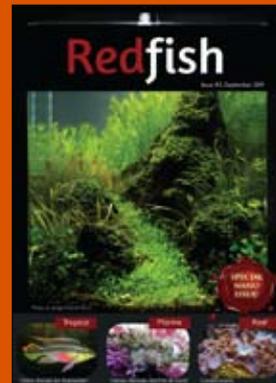
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## Redfish

### Colourful clouds

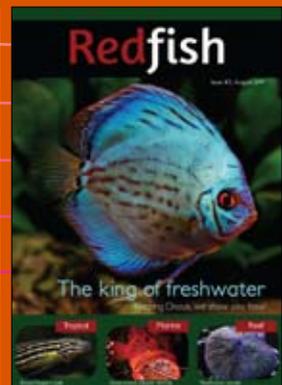
Spawning clownfish in the aquarium



## Redfish

### UPPER END

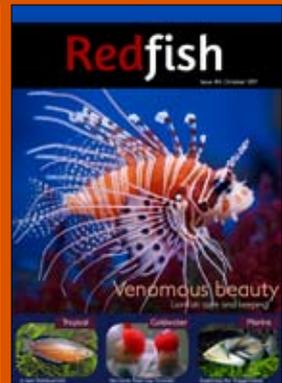
WATER



## Redfish

### The king of freshwater

Shocking Channa, but there's also love!



## Redfish

### Venomous beauty

Look at size and temper!

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