

All About Aquariums

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1. Factors to consider when planning a tank

When setting up an aquarium for the first time there are many factors that need to be taken into consideration. The first factor that normally enters future keeper's minds is "how much money" can I spend on the tank. When working out your budget always allow for the cost of any equipment that needs purchasing to run your tank. Nowadays most aquariums are supplied new as a kit form where all of the necessary equipment is supplied with the tank. This is usually basic equipment but it gives you the chance to get the tank up and running and then upgrade as you go along.

There is also the choice of whether to buy glass or acrylic tanks, make the right decision now as once the tank is paid for it is too late. I have always preferred to use glass aquariums but both sorts of tanks have their advantages and disadvantages, no-one can say which tank is right and which one isn't, at the end of the day, the choice is yours.

The following article should help you to make the right decision:

Should I buy Glass or Acrylic Aquarium?

At some time or other we have all had to make a decision when it comes to purchasing a new tank, albeit our first investment or an upgrade, do we stick with the traditional glass tank or venture into the world of acrylic tanks.

Both tanks have their advantages / disadvantages so hopefully by means of this article some of your questions will be answered.

A couple of the main aspects in deciding which tank we buy has to be the shape we require and also how big does the tank need to be to successfully keep the livestock or plants we have planned to involve in the set up.

Even a small tank made from glass can be quite weighty, not a major problem with say a two foot one but when we start looking at 50 plus gallon tanks made from glass it would be impossible for one person to move about on their own, help from a friend would be a must. This is one advantage with acrylic the weight is dramatically reduced thus making replacement an easier task (acrylic is at least half the weight of glass).

Always remember though whether using glass or acrylic the cabinet must be strong enough to cope with either.

We all know the good old rectangular glass tanks but nowadays owners are looking for various shape designs to suit their décor, glass bow fronted tanks are widely available but what about that something different, this is where acrylic can go into its own. Any shape can be constructed (spherical, concave, convex –

whatever is required) plus with the special sealing system used in the construction process these tanks are more or less guaranteed for life against leakages, whereas the silicon used in the glass sealing will break down over a period of years hence the normal of a 15 year guarantee.

Luckily for me I have never experienced this but imagine going into the tank room to find the glass shattered due to something being knocked into it or as happened in the past to one of my friends a hard ball thrown through it by one of his children, acrylic is 10-15 times more durable and it would need a lot of force to break through it. This could be a key factor where families are involved in the house.

Another advantage over glass is the fact that acrylic has much better refractory quality than glass so the viewing is markedly better, the fish can be observed much better, having said that it can also have the opposite effect if a tank is created using curved, one piece acrylic at the front. Viewing from the corners will give you a distorted picture of the inhabitants. Personally I have always used glass tanks which I keep as pristine as possible so the quality of my viewing is barely different to acrylic but this does involve a lot of maintenance, luckily that part of the hobby is one I enjoy doing anyway.

Fed up of running up an electric bill larger than usual because of your tank heaters, this can be reduced with an acrylic tank as its insulation properties are higher which means you can achieve the same running temperature with a smaller heater. So you have saved money that way but the actual cost of your tank new is going to be higher in the first place compared to glass so bear this in mind when purchasing. More style, less weight equals higher prices.

How many of you run a sump with your tank, and have you ever drilled it yourself for the pipe work. I have drilled glass tanks a few times and believe me it is a frightening experience the first time you do it. Due to the fragile nature of the glass, very slow and careful use of the drill is required whereas the opposite takes place with acrylic, the quicker you drill the better but cover over the tank where you are working with paper, cardboard to prevent it getting hot and eventually melting on the site of the hole.

Now we come to the main reason I will always stick with glass, tank maintenance.

In my cleaning tool kit I use algae magnets, a razor sharp blade on a handle, and a non abrasive scouring pad. Nothing wrong with that - not until you tried to use them on an acrylic tank. Its biggest downfall to me is the fact that it scratches so easily and this then gives the tank a dull finish where the damage has been done. There are products on the market for buffing these out, but this does involve emptying your setup and draining the water first. The only item I would

recommend you use for cleaning purposes is a cloth and elbow grease.

Great care has to be taken when putting in gravel, rocks, or heavy ornaments as this can too scratch the acrylic if done with too much gusto. I even know of someone who has suffered damage to the tank from plecos due to their rasping teeth grinding at the tank.

I have tried to offer a balanced article here on the pros and cons of both tanks. Hopefully you will purchase the right tank for you, just remember, everybody has their own personal preferences so only you can choose for yourselves which you require.

Maybe you are considering buying a second hand tank rather than pay for a brand new one. This alternative will save you money initially but always inspect second hand tanks carefully for leaks. Never buy a second hand tank from the internet auction sites without viewing it first, often cracks can be disguised on the pictures and once you have paid for it, you will be expected to pay for it.

At aqua-fish.net there is an article covering this topic:

Cheap fish tanks; Quality vs. price of such aquariums

How to buy an aquarium with discount? The gold rule still says: Ask for a discount no matter if you're buying an aquarium, a car or a house! If you are looking for a new aquarium you can choose an expensive one, such as a big aquarium installed into some cabinet. These aquariums are usually sold with everything what you may need for keeping all fish alive; sometimes with a discount, sometimes not (if there is no mention about discount, ask for better price!). The cabinet emphasizes the aquarium and it really looks nice especially if you know what and how put decoration, equipment, substrate, plants and fish specimens into the fish bowl, so that it may behave like a piece of nature cut somewhere from a rain forest or African creek. However, not everyone is able to buy such an expensive tank and there are various solutions how to obtain relatively cheap fish tanks as well.

Buying a second hand tank

One way how to buy a cheap aquarium tank is to buy second hand aquarium (or buy it from a wholesale dealer, it is mentioned a few paragraphs below). Some people decide to give up their hobby, but they don't want to dispose all equipment so they sell them for some small money. You should pay attention in such a case because the fish tank does not last forever and the glue which keeps the glass together might sprung a leak and all the aquarium creatures (especially fish!) could die, especially if it happens when you are not at home. Another problem

regarding a broken aquarium is that you must move all fish somewhere else. Generally, people don't have more than 1 tank. Moreover, introducing peaceful Tetras or Panda Cories into a tank with aggressive carnivore Piranhas doesn't sound good.

Another disadvantage of buying a second hand aquarium is that people sell them after suffering an illness which killed all inhabitants died, so that a person selling it decided to replace everything old with new ones. This might be very dangerous, because the illness may survive in the aquarium even though it looks clean like a rain drop. When you introduce living beings into such environment, then there's no doubt they will get sick and you'll have to buy medicaments or new fish in the end. On the other hand, potential disease isn't the reason for avoiding previously used tanks because you can clean the tank fairly and then let it be (without any water) for few weeks. After this period everything should be OK.

Positioning a used aquarium can be difficult too. It's because you usually can't buy made-to-measure cabinet or stand along used tank. Then you have to figure where to put the tank by yourself. In general, people prefer placing their aquariums on different furniture like cabinets, however special care should be taken at this point because ordinary furniture isn't designed to carry such weight. A tank weighs a lot of kilograms even it does not look so. Decorations, equipment, and especially gravel with water make the entire thing too heavy. For instance, an aquarium with capacity of 100 liters weighs at least 100 kilograms (this is really the minimum). Add substrate which may weigh about 20 kilograms, and decoration (if it's made of plastics then it's weight is negligible) which can be present as small rocks, large stones, or driftwood. You see that an ordinary cabinet which is suitable for TV set couldn't be suitable for an aquarium. Except small tanks with weight up to 50-60 kilograms; they should be up kept.

The last note about second hand aquariums is that you can't decide for it's shape and dimensions. You are limited by offer.

Are wholesale cheaper and more reliable?

The answer is simple; In many cases, wholesale dealers are cheaper and reliable enough for making a deal. It is because such sellers have a technology of good quality and they usually sell their products to retail networks.

Custom made tank

Basically, custom made tanks are relatively cheap as well (except cases when you want to buy 2000 liters tank!). It is only 5 glasses glued together (usually it is made of 5 glasses). The advantage is that you can select the shape which you are looking for, and the size as well. Of course if you want to buy a hexagon or pentagon shaped aquarium (with little soldiers and generals) the production will cost you more. In addition, more space means more investment. Another

advantage is that the tank should not contain any fish killing viruses or diseases, however there may be some impurities so that the tank should be cleaned before it's being used. Bear in mind that you should plan an aquarium as a whole. This means that planning a stand or cabinet, filters, lighting, heater, thermometer and everything necessary goes together hand-in-hand with planning fish and plants in the tank. You shouldn't forget about anything.

How much does it cost?

Prices may vary, however 1 Liter costs about 0.35-0.45 USD. Light bulbs (1x 25W neon tube with fixture) cost about 40 USD. Filter (designed for 100-200 Liters) might cost 15 USD. Heater (about 50W) means another 40 USD. Thermometer is another 1 USD. DIY stand will cost you about 200 USD. All in all, 100 Liters aquarium could cost from 350 US Dollars. I didn't calculate the substrate, fish, plants and any decoration.

Conclusion

Saving about 10-20 dollars is what makes the difference between "cheap" and "ordinary" fish tank. But you should ask yourself if such difference matters with the final price at about 450-500 dollars for complete aquarium (including fish, plants, etc.). Moreover, you'll have to pay bills for electricity and fish food which means more and are never-ending expenses.

So getting a small discount will not save your budget at all.

One of the first things you need to consider is how much space you have for your future aquarium, the larger the tank the easier it is to maintain so take this into consideration when deciding how much space you can actually utilise.

1. Make sure the chosen area will not be in direct sunlight as this will cause algal problems and ensure that the floor can take the weight of the tank.
2. When measuring the allotted area you have allowed for space to perform your tank maintenance.
3. Try to site the tank where human traffic will not frighten the fish by people walking past it all day.
4. When performing water changes the waste water does not have to be carried/hosed out too far and the same for re-filling the tank.
5. Never place the tank near a heat source like a radiator; this could affect the water temperature in the tank.

While you are looking around the house thinking there isn't space for a tank, believe me its surprising how many spaces are available in every home to fit the perfect aquarium.

The living room has to be the best room for your tank; you can view it while relaxing and it can be seen from your seats. Taking into account the furniture you already have in the room will influence the colour of the tank cabinet etc., the tank must blend in with the room décor.

Some of the tank options you have are as a free standing aquarium with cabinet and lid, these can even be placed between rooms, use the tank as a wall divider so that both sides of the tank can be viewed from two different rooms. Nowadays a lot of keepers are purchasing wall mounted aquariums; these leave the floor area clear or can even be fitted into an alcove.

At aqua-fish.net there is an article covering this topic:

WALL MOUNTED FISH TANKS

Many fish keepers say that looking at their fish tank is far more entertaining than watching their television. This inspired many companies to take the next step in aquariums and produce a tank that actually sits on the wall.

The wall mounted aquariums are also known as portrait aquariums; they were first produced in Korea and were actually made with a picture frame surround, hence the “portrait” in the name. These are not to everyone’s taste, some keepers think they are cruel, some fish keepers think that they are an excellent addition to the room, a showpiece to give visitors something to talk about. I personally would not use one purely for the thought of the limited swimming space, but that is my opinion.

They are mounted on the wall by means of studs or brackets, and these need to be strong to support the weight of the aquarium, nobody wants to go into a room to see the tank lying on the floor. Originally they were only sold in smaller sizes, but as they have become more popular the sizes have increased to meet demand.

Advantages of having a wall mounted fish tank:-

The main advantage for using one of these tanks has to be if you require a fish tank in a room that is limited for space. Many of the more modern housing have smaller rooms for the occupier to live in, so once all of the furniture is in there the floor space is reduced drastically. Attaching the fish tank to the wall above the furniture solves that problem straight away. There may be small children in the house, as we know they are very inquisitive, having the tank off the floor will stop them putting their fingers in the works so to speak.

A wall mounted fish tank makes an instant focal point in the room as they are usually mounted at eye level; as soon as you walk in the room it is noticed.

Standing next to the tank will give you a full view of the inhabitants.

For an even more stunning display the mounted fish tank can be positioned in a dividing wall between 2 rooms. This means that the tank can be observed from just about every direction possible.

If the fish tank is located in a busy area with a lot of people passing through like an office, shop or even an hallway there is a danger of someone walking into a floor mounted aquarium, even to the extent of someone getting injured on it if the tank broke through a strong collision, mounting the tank on a wall removes that danger.

Most wall mounted tanks are sold with all of the equipment that you need to get it all set up. Due to the narrow size of the tank some standard tank equipment just wouldn't fit inside, because of this some of the tanks are sold with modified tank equipment that are usually are hidden once set up. Some of the newer tanks now are sold with special attaching wall brackets to make the job of mounting them much easier, even to someone with moderate DIY skills.

Remember to get someone to check it out before you add any water if you are unsure as to how good a job you have made with fixing it to the wall.

Disadvantages of having a wall mounted fish tank:-

As any experienced fish keeper will know routine maintenance is something we all have to deal with to keep our tanks clean and healthy. Access to floor mounted tanks can sometimes be limited, this problem is a lot worse with wall mounted fish tanks. Access needs to be provided by means of either a top cabinet or concealed hinged flap to get into the tank itself. This, in my view, limits the amount of tank area that can be reached for routine cleaning etc.

Often the wall mounted tanks will only contain a small water volume, this makes keeping the water parameters correct a lot harder than if a larger tank was being run. Surface area is a key issue with any aquarium. Gaseous exchange as the CO₂ is driven out to allow the oxygen in requires a large surface area ratio to the tank size, as the wall mounted tanks are built with a slim design, some are as slim as a plasma television, and this exchange is dramatically reduced. The knock on effect of this is that there will probably be less oxygen in the water for the livestock.

The choice of fish is reduced due to the size of the tank. If the tank is only 6 inches wide then I certainly would not add any fish over 2-3 inches in length. Swimming space has to be taken into account when planning the tank inhabitants.

Water is not a light substance; a full tank can put enormous pressure on the fixing brackets of a wall mounted tank. In some houses or offices, not all walls are

suitable for mounting one of these tanks, the fixings will not hold if the wall they are attached to is not strong enough to support the weight.

The next disadvantage is probably the biggest factor when deciding whether to invest in a wall mounted tank or stay with a traditional floor mounted tank. You can expect to pay higher prices for the wall mounted models in comparison to a similar size tank that is floor mounted. Style always costs more than basics.

Surfing the net will probably show you that there are very many companies selling wall mounted tanks, prices will vary from supplier to supplier. Sizes will also vary a lot; always study the tank descriptions before deciding which tank you will purchase. Find out if there is reasonable access for those awkward jobs we all have to do at sometime to the tank. Make sure that the tank comes as a kit with all of the necessary equipment that you will need, buying a kit will work out a lot cheaper than buying all the items separately.

Before attempting to mount the fish tank, check that the fixing wall is capable of taking the weight of your tank, preparation could save a lot of heartache later.

Tanks can even be mounted on brickwork without the need for a cabinet, the choice of set up is endless so think carefully before just jumping in and buying the first tank that you see.

Often entering the world of fish keeping can be a bit daunting for some people and there are also people who take up this hobby not knowing a thing about how to look after the fish and the tank properly. Always do plenty of research on the net or get hold of some reliable fish keeping books to learn before you start off, it will save a lot of problems in the future.

Running a fish tank will also involve running costs, electric to heat the water if you are keeping tropical or saltwater fish, electric for the lighting and paying out for food., there will be times when you will need to buy medication for the tank. Ensure that the budget allows for all of this.

Another good idea is to research which breeds of fish you will want to keep once the tank is running, depending on which part of the world the fish come from, they will require different temperature ranges, lighting needs and often they will consume different diets to other breeds of fish. Different breeds of fish will often require different tank décor to other species, work out exactly how you wish the tank to look, even draw a plan on a piece of paper if it helps to get the final picture in your mind. If you intend to keep larger fish then it follows that you will require a larger tank, if you intend to keep a lot of catfish

a long narrow tank is better, all of these things have to be considered when planning your tank.

One important [point that many keepers forget about is to arrange insurance for their tank; this can be built into the house insurance if your providers agree or a separate insurance may be required. There is no point spending a lot of money on a tank and losing it all if anything goes wrong.

In the next chapter we will discuss setting up the tank and different types of décor available for use.

2. How to set up an aquarium

Once you have found an ideal site for your aquarium, the real fun begins as you start to set it all up, this is where it all comes together and any research that you have done will start to pay off.

Before the tank is pushed into position, the first thing you need to consider is do you wish to use a background, are you going to go out and buy a background or paint the back of the tank or just not bother. There are plenty of designs to choose from that are supplied on roll form and are simply purchased to the correct length and height for your tank, have a look around and see which will blend in best with the design that you have in your head for the finished set up. Painting the back of the tank is very simple, use a lead free emulsion or gloss of your chosen colour and apply it but allow it to dry completely before adding any water to the tank. The following article will explain in more detail about backgrounds:

DIY Aquarium Backgrounds

When setting up your new aquarium one of the most popular items to purchase is a nice tank background to set off the look of the tank. But why do we feel the need to add a background to our tanks?

Personally speaking I have a few reasons for always adding a nice background. I find all of the wiring and piping from filters, heaters and such like look very unsightly hanging down from the back of the tank. A background will hide all of these instantly and give your tank a nice, neat finish. I have known from the past that sometimes certain fish will be spooked by seeing their reflection in the glass and it can cause them to go into hiding or even stop eating. A nice background is very pleasing to the eye for me and any visitors that may wish to view the tank.

When I am setting up a specific biotope the right background ensures that the tank looks as it should depending on which fish I am keeping, a typical example of this is for a Malawi tank where a rocky background falls right into place.

Purchasing a background for your tank can sometimes prove to be quite a costly affair, especially when adding a structured background. The easy way around this is to make your own, this task can be done by any fish keeper with a little effort and the finished item looks just as good as any bought background.

One of the most common ways of adding a background is to go out and purchase it from a pre designed roll. There are several designs available but these are not always to everyone's taste. Rather than spend money I have on several occasions simply painted the back glass of the tank with a color that I choose to use, this method looks just as good as any roll design available.

Slate can also be used to great effect on the back glass; this gives a darker background which really makes the colors of the fish stand out. The easy way to make this is to cut your slate to size using two pieces so that you can insert it into the tank without having to juggle around the bracing bars. Lay the tank onto its back placing a Styrofoam sheet underneath to protect it, and then all you have to do is stick it into place with aquarium silicon. Leave this for 48 hours so that the silicon will cure properly before moving the tank to its intended position. If you have a lot of patience you can even use rocks that are light, a good example is tuffa rock, to create a really good rock face background with this method. If using tuffa rock then seal the background with clear pond paint or a similar product as it will slowly dissolve if in direct contact with the tank water.

For the artistic of us there is a way of making your own sculptured background for a fraction of the price of a purchased one. Basically this design is made from sheets of Styrofoam carved to form the rock shapes, this gives you the artistic license to create whatever rock face you wish. I have found this backing to be very effective in a Malawi set up and with a little imagination the same method can be used to create a mangrove root backing for an Amazonian set up. First thing I did was to measure the foam sheets to give me three sections which would fill out the back of the aquarium, using 3 separate pieces makes life a lot easier when placing the back ground into the tank. On top of my three base sheets irregular smaller pieces of Styrofoam were glued into position with aquarium silicon to give a rough rock face. It is a good idea to place the smaller pieces loose onto the base sheets initially until you are happy with the design.

Once the smaller pieces are fixed into position, leave them for at least 12 hours to allow the silicon to cure. At this stage it is necessary to cut grooves into the background to allow for the installation of heaters and a hole will need to be cut for the inlet and outlet pipes of the filter. Doing this now saves a lot of time at a later stage plus if mistakes are made they can easily be covered over. The Styrofoam will still not look very realistic at this time, but this is where the clever bit comes in. To mould the foam into a smoother surface that will actually look like rocks, heat will need to be applied to lightly melt the foam into a smoother surface. In my case I used a miniature blow torch that I had saved from my modeling days, a larger blow torch can be used but take care not to apply too much heat.

Now you have a gleaming white rock faces, not very natural looking but getting there. Using a non toxic stone colored paint; highlight the rocks trying to use a darker shade for the indentations to give a better effect. If you don't want to use paint then sand can be used for the top coat, this is held in place by spreading silicon all over the surface and then laying the background onto a tray full of the chosen media.

The whole background, front and back, needs to be water proofed. I found the

easiest way to do this was to use some left over clear pond paint that I had but I do know of several people that use epoxy resin for the final finish.

The finished background can then be siliconed into place in the tank, allow the whole project several days to dry out completely before adding any water into the aquarium and there you have a quality background which will look just as good as any for sale, a lot of money saved as well.

The background will look even more stunning when the tank has been running for a while and there is a slight growth of green algae on it, well worth the effort!

If you are planning to set up a biotope or set the aquarium up with a particular theme take this into account before you add the background as it can affect the whole finished look if the background is not chosen correctly. Biotopes are simply the best re-creations that we can make in a confined space of natural areas of waterways from different parts of the world.

Here are a few examples:-

1. Lake Malawi

Recommended size: 250 l (54.975 ga)

Description:

Lake Malawi was formed 1-2 million years ago. This geologically young, rocky lake of the East African Rift is about 375 miles (604 km) long and 53 miles (85 km) wide, making it the ninth largest lake in the world.

The lake is bordered by Malawi, Mozambique, and Tanzania. This lake is dominated by cichlids, most of which are endemic to the lake. Over 280 cichlid species have been described, although estimates of up to 500 cichlid species have been made. The largest group of Cichlids found in this lake is the Haplochromines with over 120 species and 48 genera. Among the Haplochromines, are the Peacock Cichlids of the genus *Aulonocara*; the Mbuna, a large group, including the genera, *Cynotilapia*, *Labeotropheus*, *Labidochromis*, *Melanochromis*, and *Pseudotropheus*; and the larger piscivores of the genera *Cyrtocara*, *Nimbochromis*, and *Sciaenochromis*.

Water

pH 7.8-8.6, 6-10 dH, 23-28 °C (72-82 °F)

Tank

Provide plenty of rockwork and caves with hard alkaline water with a pH of at least 7.8. The bottom substrate should be of a material that will aid in the pH

buffering capabilities of the water. Good substrate choices could be Dolomite or crushed coral to aid in buffering the water. Tankmates should be from the same area and be able to fend off their attentions.

Plants

Vallisneria is the only commercially available species, but Anubias and Java Fern are also suitable if the aquarist is willing to bend the biotope rules.

Fish

Lake Malawi cichlids (Mbuna, Peacock cichlids, Others), Synodontis.

Taken from Rhett A. Butler/mongabay.com.



2. South American Blackwater Creek

Recommended size: 150 l (32.985 ga)

Description:

Black water creeks originate from the rain forests, tributaries from the main rivers slow down into slow moving creeks that are stained a coffee color from the decaying vegetation and fauna. Often fallen trees are found in these creeks providing hiding places for the aquatic life who have adapted to living in these very acidic water conditions. The water will appear relatively transparent but once the seasonal rains take place the water takes on a very different complexion. The water becomes muddy as the rains sift down the silt from the surrounding lands areas, dragging in even more vegetation and tree branches with it. There is no hardness to the water which explains the very low pH and the creek beds are made up from a fine clay or sand. Rocks are very rare in Black water creeks, so

much so that the local inhabitants use rocks for trading purposes.

The canopies above are quite dense, blocking out much of the sunlight, these are favorable conditions for the more timid fish species and amphibian life.

The creek beds are normally orangey color clay with a couple of inches of rotting vegetation on top. Flood water creates several ox-bow lakes to the sides of the creeks which in turn will have their own inhabitants, often fish swept over with the flood water.

There is plenty of insect life above and on the surrounding banks of the creeks for the fish to feed on, especially in the rainy season when food is at its most obtainable. This is the time that most of the fish species will go into spawning mode.

The pH of the water is found to be 5.5-6.5, hardness is very soft (0-4 DH), and the temperatures are higher than most tropical areas, running at 26-29 deg C.

Setting up the tank

To recreate this biotope it is a fairly easy task with a little imagination. Fine sand or clay needs to be used for the substrate, laterite would normally be suggested but as the plants to be added are limited in this set up then stick with the cheaper option. Create formations using wood, mopani is ideal as it will help to reduce the pH as well as adding tannins to the water to give the coffee colored effect. Be creative with the wood to create interesting shapes but don't make it look too formal, random is better. Random planting with the suggested plants should also be random, try to cover areas of the wood to provide hiding places. Lighting needs to be subdued and the water flow from the filtration should be very low.

Plants for the tank

Sword plants and Vallisneria is all that is needed for this biotope as the wood arrangements are the main feature. Sword plants come in a variety of sizes according to the species, so include several different species in the tank and use the Vallisneria as a back ground to middle ground plant. Always plant randomly.

Fish for the tank

This biotope can either be a discus or angelfish biotope but do not mix them. For the more inexperienced fish keeper I would recommend going for the angelfish biotope as they are a much hardier species. Tetras, especially cardinal tetras look really stunning if added as a small shoal, and for the bottom feeders a group of Corydoras will keep the substrate clean.

Other fish that can be used are Hatchet fish, Loricarids and Dwarf cichlids. Apistogrammas will always provide entertainment in the tank.

Source of information

Taken from Rhett A. Butler/mongabay.com.



3. Northern Madagascar

Recommended size: 100 l (21.99 ga)

Description:

Madagascar is a large island in the Indian Ocean off the south eastern coast of Africa. This island hosts many plant, fish and animal species that are purely endemic to it. It was originally joined to Africa but split away 160 million years ago. A lot of the current habitats are under threat as more and more of the natural landscape is being converted to paddy fields for the cultivation of rice. As deforestation is occurring at a fast pace erosion is starting to increase along with the introduction of exotic fish species like the snakeheads and mosquito fish, the endemic species of fish are starting to decline rapidly. Some of the species are even thought to be extinct as no reported sightings have been made for several years.

Tilapias were introduced to the rivers and streams as a food source but due to their aggressive nature they have displaced many of the native cichlids.

Setting up the biotope

The recommended size tank for this biotope is at least 100 L (22.0 gallons). On Madagascar the water is hard compared to other regions, 8-19 DH with a pH of 7.0-8.0.

Temperatures should be set between 24-29°C depending on the livestock you are adding. Due to the large temperature range always research the fish you are going to add.

The rivers and streams on Madagascar have sandy substrate with earth banks and lots of plant life so the substrate should be fine silica sand or fine gravel.

Lighting should be bright to give the desired effect but a steady current in the water is needed so it is advisable to dampen down the water flow on the filters with spray bars if possible.

Suggested plants for the biotope

Background to middle planting can be achieved with Aponogeton Bolvinianus, this can grow quite tall, up to 30” in its own habitat but in an aquarium it rarely exceeds 20 “.

Bacopa Madagascariensis also makes a great plant for the middle of the tank, but reserve a place in the middle for a specimen plant like Aponogeton Madagascariensis commonly known as the Lace plant. This is getting hard to find in its own habitat but they are available to buy, the shortage does reflect on a higher price though.

For the front of the tank add some clumps of Blyxa Auberti mixed between random pieces of driftwood.

Another good specimen plant is Cyperus Alternifoliosus; also know as the umbrella plant. This is closely related to papyrus and can grow quite tall.

Suggested species of fish

Bedotia Geayi is a rainbow fish that is endemic to Madagascar, commonly known as the red tailed silverside. Adult size of this fish is 3.5 inches and it prefers temperatures around 24°C.

Cichlids like the Paretroplus family can be added, there are a few species of these to use but these may need to be ordered from a specialist supplier.

Killifish are a must with their beautiful colorations, lots of variations to choose from and easily available to purchase.

Freshwater gobies are found everywhere in Madagascar, brackish species are also to be found in the river tributaries.

If you are planning to add cichlids from other areas of the world, research them first as they may attack or even eat the smaller inhabitants of your tank.

Additional sources of information

Rhett A. Butler/mongabay.com (fish.mongabay.com/biotope_madagascar.htm).



4. Southeast Asian River

Recommended size: 100 l (21.99 ga)

Description:

South East Asia covers generally mainland Asia plus the islands of Sumatra, Borneo and Java. In earths long past these were all joined together with a large river system running through them all. This area is rainforest where the land water will move down to lots of tributaries. In the rivers there is virtually no current, a very slow moving environment with lots of dense and decaying vegetation. Bamboos and ferns are above and below the waterline, the natural substrate and rocks being a deep red coloration as there is a strong concentration of Iron in these waters but the overall mineral content is very low.

Due to the rotting vegetable matter the water is acidic; a pH of 6.0-6.5 should be maintained in your biotope. Hardness should be between 2-8 DH and the water temp in this area is on average between 26-29°C, once again these should be duplicated in the biotope.

Salt can also be present in some areas, admittedly in low concentrations, but if added to the tank in small quantities it will be beneficial to the fish without harming the plants. As the natural are comprises of various river tributaries, there are many places where the depth of the water can be very shallow, this means that when selecting your tank depth is not a key issue.

Setting up the Tank

For the purposes of this biotope length in the tank is more crucial than the depth. For a pleasing visual display and to recreate the shallow river scene required, I

would suggest a tank that is 48 inches in length, 12 inches width, and 15 inches high. This will give the illusion of a long shallow river, but if space is at a minimum then a 36" tank will suffice but remember that some of the fish that will be included in this set up will grow to quite a large size. The substrate needs to replicate the deep Iron red of the natural habitat so the obvious choice there is some nice rich red laterite, this will also be of great benefit to the plant life. On top of this add some fine red gravel or sand, even separating areas of just sand or gravel will enhance the look. Another option is to use the Seachem Fluorite; this is red clay gravel that also acts as a great plant growing medium. Add some bogwood to replicate tree roots, not too much though as this can ruin the effect. Scatter some small pebbles and rocks in a random fashion but make sure they are inert as the water is acidic and they could react with it if not. The substrate should be slightly higher at the back of the tank so as to give the impression of a sloping bank plus any detritus will fall to the front of the tank making it easier to siphon out. This is all the hard scaping that is required, now we need to look at the plants to be added.

Plants for the biotope

Suggested plants for this set up include *Cryptocoryne Wendii*, *Cryptocoryne Nevilli*, and *Hygrophila Polysperma*. Some keepers will add *Vallisneria* to this set up to give a good mid ground effect with the long strands of leaves floating upwards to the water surface but I find these tend to grow better in neutral to slightly alkaline conditions. This doesn't mean that they will not grow in an acidic environment so try a couple of plants if you wish just to see how they get on.

With the crypts it might be better to add them after the tank has been running for 2-3 months as they do not like new tank set ups. They will often suffer from crypt meltdown where all of the leaves will die off but these should re grow if left to their own devices.

Onion plants will also be suitable but remember to leave the crown of the bulb showing above the substrate. Bamboo plants are also a good choice for this biotope and if the tank is open topped then allowing some shoots to grow above the water surface can make a very good effect.

Suitable fish

Most loaches, Barbs, Danios, Red tail sharks, Bala sharks, and small Asian catfish are more than suitable for this biotope. Always check that the size of the tank is right to suit the adult size of the fish you are adding or be prepared to move the adults to a larger tank in the future. Bala sharks and clown loaches will definitely out grow a three or four foot tank so research before buying. I have seen this biotope set up with just a shoal of green tiger barbs and the effect was stunning.

Lighting for the tank

Add sufficient lighting to encourage the plant growth but do not add excessive

lighting. This will lessen the natural effect you are trying to create, if necessary it might be advisable to add a CO₂ system to make up for the lighting shortfall but let the plants settle in before deciding whether to pay out for this additional equipment.

Filtration

As with any tank set up the filtration must be able to cope with the livestock that is being added but what you do not want is a fast current flowing through the tank, this will also spoil the overall effect you are trying to create. If you are running an external filter then add a spray bar to disperse the current from the outlet pipe, it may be even necessary to have it pointing towards the back glass to reduce the current even further. If you are using an internal filter it is even possible to buy spray bars for some of the more popular models. Failing that adding a wide outlet nozzle will dampen the water flow.

It may be necessary to add extra oxygen via an air line due to the lack of current but if this is the case a steady stream of bubbles sited in the corner of the tank should not be too conspicuous.

Additional sources of information

mongabay, aquarticles, wetwebmedia



Biotopes are normally constructed by experienced keepers who have decided to specialise in certain species of fish but looking at the different set ups can often inspire people to coming up with adaptations of their plans and the finished tank.

The next step in our set up is to add the gravel or sand depending on which substrate you have decided to use. There are a few factors to consider when choosing your substrate, some sand like coral sand will raise the pH of the water, if you are keeping fish that require soft, acidic water then don't use this. If you are keeping catfish or Corydoras they will be sifting the substrate for food and sharp gravel can damage their delicate barbels, only use sand or fine gravel for these fish.

Whichever substrate you have decided on it will need rinsing before it goes in the tank as when you purchase it, there will be residual dust with it that needs to be removed. If you are setting up a small tank the substrate can be rinsed under water through a sieve or strainer but if you are rinsing larger quantities, then its best to use a bucket and hosepipe to get all of the dust out. Just keep repeating the process until the residual water remains clear. Skipping this step of cleaning the substrate can lead to cloudy water at a later stage, it may seem laborious and time consuming but well worth it in the long run.

Below is an article about the benefits of using sand over gravel:

Aquarium sand

Advantages

- Many fishes hail from sandy environments in the wild and will love a sandy substrate in the aquarium. For some species, sand is more or less mandatory, e.g. for bottom feeding fish with delicate barbells adapted for fine sand rather than coarse gravel. There are also many species of fish and invertebrates that likes to hide in sand and some will even dig out burrows. Examples of popular fish that will appreciate a sandy substrate are Tanganyikan featherfins, shelldwellers and sandsifters.
- Some species will only breed in sandy aquariums.
- Some species need sand to aid digestion.
- Sand is an ideal choice for many species of aquatic plants.
- Since grains of sand are smaller than gravel, there will be more surface area for beneficial bacteria to colonize.

Sandy bottoms occur in the ocean as well as in brackish environments and in freshwater lakes, rivers, streams and ponds and sand is therefore used in all sorts of aquariums.

Risks

- Fine sand is more tightly packed than coarse gravel and it is therefore easier for “dead” pockets without any water circulation to form. Such pockets will become oxygen depleted and no aerobic biological filtration can be carried out there. You can reduce the risk of dead pockets by using only a thin layer of sand. If you wish to use a thick layer of sand, make sure to disturb it frequently. You can also add animals that will disturb the sand for you, e.g. animals that dig tunnels in the sand.

- If you use a siphon to clean the sand or siphon out water close to the bottom during water changes, the light sand may be sucked up and end up in the bucket.
- Sand is not recommended for under gravel filter systems.
- Grains of sand can easily scratch acrylic aquariums, e.g. if some grains end up between the acrylic glass and the magnetic algae scrubber.

Choosing sand

Today, many different types of sand are used in aquariums and it is important to choose an appropriate type because just like gravel, the mineral content of sand may affect the water chemistry in the aquarium. Color and grain size must also be taken into consideration. A shy fish kept in a well-lit aquarium can for instance feel less threatened if you switch from bright, reflective sand to a darker variety. If you wish to keep fish with soft bellies, such as rays, you should try to find really soft, fine sand that won't cause any injury.

Well stocked aquarium shops will typically offer at least six different sand types: silica/blasting sand, black beauty/powdered iron slag, play sand, coral sand, aragonite and black Tahitian moon sand. Play sand can also be purchased from home supply stores and similar since it is used in sand boxes and for brickwork.

Silica sand is used by the sand blasting industry and is therefore also known as blasting sand. It is comparatively cheap and you can normally get 100 lbs for roughly \$10 in the United States. It has a pale tan colour and the grain size is extremely fine.

Black beauty sand is also used by the sand-blasting industry and can be purchased in home supply stores. It is not naturally occurring sand; it is powdered iron slag. The iron will affect the chemistry of your aquarium and this must of course be taken into consideration. Powdered iron slag can have pretty sharp edges and is therefore not the best choice for species continuously sift sand.

Compared to silica sand, play sand is more heterogeneous when it comes to grain size and colour. It is normally darker than silica sand and contains quite a lot of clay. Play sand is inexpensive; it is sold in large quantities to people who use it to fill up entire sand boxes.

Coral sand is made from corals and is typically used in aquariums where there is a need to keep the pH-value high (alkaline) and the water hard. It is more expensive than silica sand, iron slag and play sand, but less expensive than aragonite. Coral sand is usually white with a heterogeneous grain size.

Aragonite comes in many different colours and grain sizes and is one of the most

expensive types of sand. Just like coral sand, aragonite can help you adjust the pH-value and water hardness in the aquarium.

Another example of comparatively expensive sand is the beautiful, but costly, black Tahitian moon sand. Black Tahitian moon sand is commonly used to make colourful fish look even more flamboyant in aquariums, since their flashy colouration will contrast sharply against the black sand. Unlike black beauty, black Tahitian moon sand is not made from iron slag.

Set-up

When you have decided which sand that is best for your aquarium it is time to prepare it. Unless you use live sand, the sand should be thoroughly cleaned before being added to the tank. One commonly used method is to simply place 2 gallons of sand in a 5 gallon bucket and fill the bucket with water, ideally by using a hose with a sprayer attachment to make the water stir up the sand really well. High pressure spraying will help you remove as much debris as possible. A dirt film will form and should be promptly removed from the water. Continue to spray and remove dirt until the water is clear.

When you have filled the aquarium with sand, it is time to add the water. In order to avoid the water beam from splashing sand everywhere and forming a crater in the substrate, you can place a saucer on top of the sand and let the water beam hit the saucer instead of the sand.

Do not turn on pumps and filters until the sand has settled in the aquarium, because equipment may jam if you turn it on when there is still a lot of sand floating around in the water.

Maintenance

Generally speaking, it is a good idea to vacuum the sand every 2-4 weeks. (There are naturally exceptions.) You only have to siphon up surface detritus. During the first few tries it is common to involuntarily siphon up a lot of sand, but practise makes perfect. Just keep the end of the siphon roughly half an inch over the sand.

It is advisable to churn the sand 3-6 times per year, especially if you don't have animals that will churn the sand for you. Without churning, large pockets of toxic gas can form inside the sand bed, especially if it more than 1.5 inches thick. The sand will also stratify (form layers) over time. Churning releases a lot of debris so a good vacuuming is recommended afterwards. Always turn pumps and filters off before churning and wait for everything to settle before you turn them on again.

You don't have to move stones and other decorations when you vacuum, but it is a good idea to move them while churning to make sure that no gas is trapped under them.

What is live sand?

Live sand is sand with living organisms in it. In some cases, the living organisms will only be added bacteria, but “true” live sand is filled with the same variety of life forms that you would encounter in the wild. Live sand is typically used in marine aquariums to create a more well functioning ecosystem. Unlike other types of sand, live sand should not be cleaned before use because cleaning it may harm the inhabitants.

Source: AC Tropical Fish & Aquarium

And here is an article detailing the benefits of using gravel:

Aquarium Gravel: Old fashioned, or just overlooked?

Aquarium gravel has been the staple substrate for fish tanks and aquariums for many years, but is it still popular, still needed, or just something that we use because it’s simple?

The answer to this is complex. Aquariums have become works of art in the last few years, ranging from simple ornament displays to heavily planted and beautiful aquaria. Because of the change in opinions about fish keeping and the desire to explore new avenues of design and appearance, gravel has been replaced by hi-tech substrates in many aquariums. Products like Flourite, which are enhanced with nutrients to sustain plants have become more common, sand has become a very common substrate in aquaria because of the ease with rooting plants, and substrates like marbles and glass beads have become popular because they look nice!



The improvements in filtration have also helped common aquarium gravel to be pushed out, as the newer filtration systems such as HOB (Hang on Back) and Canister filters don’t need a gravel substrate to help them to work, unlike the UGF (Under Gravel Filter) which for many years was the most common aquarium filter in use.

So, do we still use gravel in our tanks? Many aquarists do still use gravel for basic

tanks or those die-hard's that still use UGF to maintain their tanks. Others will use aquarium gravel as part of the décor, with a vast range of colours and sizes available to them. People who breed fish will still use gravel to enhance their breeding tanks, where they need specific environments for the task, or if they use UGF to keep the water conditions stable.





As author of this article, I will openly admit that I use aquarium gravel in all my tanks, so I may be biased; I also use UGF for most of my smaller aquariums as my choice of filtration, mainly because of ease of maintenance as well as cost! However, I am in the minority now, as most have opted to go down the route of external filtration and planted tanks. This is not a problem, its called progress! Saying that though, this is where the gravel issue comes to point.

Do you need aquarium gravel? No. Many aquariums are very happy without it. Many aquarists prefer to use alternatives to build their tanks around, making aesthetically pleasing aquaria, with everything in balance, lots of plants, more colour and stunning looks! I love to see a well maintained planted tank with lots of luscious green plants and the need to look hard to find the fish!

So do you want to use aquarium gravel? That is your choice. It depends entirely on what final effect you want to obtain and the type of filtration you choose. Most small aquariums with basic ornaments and a few plastic or silk plants will tend to use gravel as the substrate for several reasons:

- * It's cheap to buy, costing just a few dollars/pounds for a reasonable sized bag.
- * It's simple to use, needing nothing more than a quick wash to remove the dust.
- * Plastic and silk plants bury very easily in the gravel, and most need the weight to hold them in place.
- * Ornaments can be placed directly onto the gravel substrate without any problems of stirring up the sediment.
- * Maintenance is simple. A gravel vacuum during water changes is the only regular maintenance needed.

- * If using UGF, gravel is an essential part of the filter, being home for the nitrifying bacteria.
- * If you have a strong current in the tank, caused by the filter outlet, many substrates will lift and become water borne, whereas gravel will stay on the bottom. (I once had almost a whirlpool in a small tank and all the sand I was using as substrate was pulled into the current and very quickly blocked the filter!)

These points aside, the alternatives are also attractive.



Glass marbles look really stunning in small aquaria and are safe and clean to use. A gravel vacuum works just as well on these to clean the detritus from the bottom and for some fish, these are better for breeding, since eggs can fall out of reach of the parents between the large substrate.



If you want a planted tank, don't write off gravel as a substrate. It works very well with most plants, giving them a stable base to root into, and most will thrive with little additional assistance. Liquid fertilizer being the main additive required. Even if you have a UGF, plants root very well in gravel in most situations. Yes, many use other substrates, but they pay for the privilege, as most other substrates cost substantially more than common aquarium gravel.

This picture was provided by Peter. The gravel is mixed with sand.



Sand is now replacing gravel in many tanks. This is an ideal medium for many plants and fish, and so long as you don't have anything to disturb the bottom too much, it gives a very pleasing result. However, it is much harder to keep clean, as traditional methods don't work, but if you are careful with feeding etc, it works well.

If you have a large aquarium, you could consider having more than one substrate. It is not unusual for large aquariums to have a changing theme running along the length, ie, heavily planted at one end running to rocky open-water the other. Here you can test your skill and try different substrates to give the different effects.

Whatever you choose to use for substrate, plan carefully before you start, as mistakes are not always easy to rectify. As for me, I still prefer the regular, common, plain aquarium gravel in all but large tanks, but that's just my opinion!



The first layer of the substrate:





So as you can see the choice is yours as to which substrate to use, both have their advantages and disadvantages. When adding your substrate always try to slope the depth of it downwards from the back of the tank to the front, in the case of sand or really fine gravel you may have to incorporate terracing to keep it all in place. Adding it this way is not only pleasing to the eye but beneficial to planting and the fish waste will always collect at the front of the tank making cleaning easier.

Once the substrate is in place we can start to look at adding the equipment required to run your tank. One of the first you will need to add if you are planning on keeping tropical fish is a heater, this will normally attach to the back of the tank by means of suckers.

Always remember that the heater must never be switched on if it is not covered completely by water!!

Place the heater so that it is at roughly 45 degrees and above the substrate without touching it. If you have purchased an aquarium kit, the heater supplied will be the right rating for your tank but if you are buying separately then the following article will give you guidelines as to the correct size for your tank.

At aqua-fish.net there is an article covering this topic:

Aquarium heaters

One of the most vital pieces of equipment in an aquarium has to be the heater. This is often neglected and forgotten about when placed in the tank but it plays a vital role in the fish's welfare. Misplacing a heater in the aquarium can often mean cold spots in the tank or the heater cannot run as efficiently as it should be doing, hopefully this article will help give everyone a good understanding of how a heater should be used.

When should a heater be placed in a tank and why are there some tanks without them?

Many species of fish are classed as coldwater fish. When keeping a coldwater tank, there is no need to add a heater as the fish prefer to live in cooler temperatures. Sub tropical and tropical fish come from climates that have higher water temperatures, this is the reason that these fish need to be kept at temperatures above room temperature.

How does a fish tank heater work?

The heaters that are used for aquariums are basically an element enclosed in glass or stainless steel and the temperature is controlled by a thermostat. With every heater there will be an adjustable dial that you set to obtain the required temperature for your tank.

How much do heaters cost?

There are many brands of heaters available; they vary in price according to the quality and accuracy of the heater. A basic 50 watt heater will cost about 9 pounds (18 dollars), a titanium heater that is very accurate can cost up to 40 pounds (80 dollars). The golden rule is to always buy the best heater that you can afford; it will pay dividends in the end.

Which brands of heaters are considered to be the most reliable?

There are many brands of heaters to choose from, the brand you use is often down to personal choice, one person may use one brand all of the time, another person may think that another brand is a lot better. The most popular heaters that are generally seen on the market are made by companies like Tetra, Azoo, Marineland, Hagen, Rena, Fluval, Tetra, and Eheim. There are more but too many to list.

In the UK it seems to be the Fluval, Eheim, and Tetra that are mostly used but nowadays there a lot of imported Chinese makes coming onto the scene.

What is the correct way to install a heater and are they fully submersible?

The correct way to install a heater is to place it at the rear of the tank in the water flow from a filter. This will enable the heat transfer to be constant all over the tank. Cold spots need to be avoided at all costs. Never lay your heater down on the substrate, using the suckers or brackets that come with the heater, attach it to the back of the tank at a 45 degree angle. If the heater is simply laid down on the substrate, most of the heat emitted will be soaked up at the bottom of the tank and not into the rest of the water. Nearly all available heaters are fully submersible but always double check before you place them in the tank so that there can be no doubts.

I am currently using a titanium heater with a separate thermostat, the heater element can be submersed but the thermostat has to be kept away from the water and is fixed in a separate location.

How long should I leave the heater switched on every day?

Once the heater is installed, leave it plugged in all of the time. As it is thermostatically controlled, it will turn itself on and off as required. The only exception to this rule is when you are performing a water change and the water level is going to drop below the safety level marked on the glass exterior of your heater. In this case, unplug your heater before starting the water change but don't forget to plug it back in once you have finished.

How do you know if the heater is on?

With every heater system, there will be an LED light on display that will light up when the heater is actually heating the water. When the water is warm enough, the heater will turn off and the light will go out.

How do I know which size heater to get for my tank?

The size of the heater required for the tank is determined by the amount of water volume the tank holds. With the packaging of every heater there will be a chart guide that tells you which size heater you need for which size tank. It goes without saying that the larger the tank the larger the heater required.

The general rule is that 5 watts of heater is required for every gallon of water in the tank. This means that if your tank is 5 gallons, then a 25 watt heater will be needed, for a 50 gallon tank a 250 watt heater is needed. Remember that the larger heaters go up in stages of 100 watt intervals so if 250 watts is required, you will need to purchase a 300 watt heater.

What do I do if my tank water volume is too large for one heater to cope with?

The easy solution to this is to place two heaters into the tank, one at each end. If your tank is 300 gallons you will need 1500 watts of heating. In this case you will need to add three 500 watt heaters so that the correct temperature can be reached.

Does room temperature affect the temperature readings?

If your tank is situated in a cooler room, then you should add a larger heater to your tank, in a warmer room, the heater will be doing less work. A tank without a heater will also be affected by room temperatures; remember this when keeping coldwater fish.

Can I use a 200 watt heater in a small tank?

Theoretically you can use a larger heater in smaller tanks, the only downside to this is the fact that the water may over heat and affect your fish. It is much better to use the recommended size for the tank you have.

Do I need a heater in a planted tank?

Most plant species do better in a heated tank but some are perfectly o.k. in a coldwater set up. For coldwater use plants that are proven in ponds as you know they will survive. Most good plant dealers will let you know which temperature the plants prefer.

How do I know what the temperature of my tank is?

The only way of answering this is to tell you that with any heated tank you must add a thermometer to the tank so that you can check on a daily basis how warm the water is. Thermometers are relatively inexpensive but could save you a lot of problems.

Can I keep guppies in a coldwater setup?

The answer to this is yes and no!! If the parents were raised in coldwater then they will be alright, but if they are purchased from a shop that keeps them in warm water then they should be kept in a heated tank at 26 degrees.

How do I heat an outdoor tank?

With the tank being outdoors use a larger heater than you would normally and keep a lid on the tank to prevent too much heat loss. Many ponds are heated and use large titanium heaters, these can be up to 800 watts rating but they do work effectively.

Once the heater is in place the next item to add is the filter.

As with the heaters, if you have purchased an aquarium kit then the correct filter should be supplied for your new tank. I always refer to the filter as the heart of the tank; this is where the water is cleaned of all toxins that can affect your fish's health, it converts the fish waste to less toxic compounds that are eventually removed by water changes. Depending on the size of your tank you will either be running an internal, under gravel or an external filter (this can be hang on the back or a canister).

All filters work on the same process. They have an intake (this will be a pipe in some cases, with an internal it will be vents in the casing), they all contain media that contains the beneficial bacteria to cleanse the water, and they all have an outlet.

The internal filters fit inside the tank by means of a bracket that is mounted to the glass with rubber suckers, the same sort of suckers are used to hold the pipe work on external filters. Hang-on-back filters simply sit on the back of the tank and the inlet pipe sits in the water while the outlet drains back into the tank.

How the filter works will be explained fully in chapter 4

The various types of filters are fully explained in the following articles:

AQUARIUM FILTER SYSTEMS

To a novice fish keeper, choosing which filtration system to purchase for their tank can sometimes be a bit confusing. There are several types to choose from so which will be the most efficient for their tank. There is no point paying out for a large canister filter when running a small tank, researching what is required can save money but still maintain high water quality.

The two main factors in choosing which system are, the volume of the tank, and what stock are you going to keep in it. In some cases a secondary filter may be required; if this is the case then it doesn't always mean paying out for two identical ones, a smaller one will often be used for a back up. Planning your filtration system at the start will save a lot of time and hassle in the future.

So why do I need a filter?

An aquarium has closed parameters; this means that when your fish foul the water it is trapped in the tank unless pulled out by other means. In nature the seas, lakes or rivers will remove their pollutants, debris on their own, this cannot happen in an aquarium, we must supply the means to overcome this ourselves.

- Fish waste will produce toxins in the water, the primary one being ammonia. With biological filtration, the ammonia is converted to nitrites,

and then these are further converted to nitrates. The most common way of removing nitrates is by water changes; however they can also be reduced by introducing plants, even by the addition in saltwater tanks of a nitrate reactor.

Ammonia and nitrites are very harmful to the fish; this is why a tank must be cycled, to put it simply, your filter needs a large enough colony of beneficial bacteria to handle the waste. “New tank syndrome” occurs when livestock is added too quickly to the tank; this will result in some early deaths of your fish. Bacteria will not only colonize your filter but also the substrate and any décor you have in the tank.

The surface area of the filter media used for housing these bacteria is designed to hold as many as possible, with most filters this is usually done with sponges or ceramic rings. The bacteria also need oxygen for survival, either an air line can be added or some filters will draw in air so that the bacteria will always have contact with the dissolved oxygen.

- Mechanical filtration is the second most important task your filter should provide. This is where any suspended debris and dirt is removed from the water prior to the biological filtration taking place. This is important as it can impede the bacteria from doing their job, so this action is usually the first area that the filter will concentrate on.
- Chemical filtration, as the name implies, removes chemicals from the water. In most cases the chemicals are introduced by adding medication, but in other cases, they can be introduced when adding mains water while you are doing a water change. After running a course of medication, it is crucial that any left in the tank is removed as soon as possible.

Some of the basic filters do not allow for this, take this into consideration when deciding which one to purchase.

Types of filters

As mentioned above there are several types of filters to choose from, so I will now try to give you a quick guide as to what is available on the market, this should help make your decision much easier.

Under gravel filters:-

These filters have been around for years, in the early days of fish keeping they were the only one available for quite a while. There are mixed views on this type of filtration and many of the modern fish keepers will always avoid using them, but on the other side of the coin other keepers swear by them. They comprise of a filter plate that sits directly on the bottom of the aquarium, and then the gravel is placed on top. Uplift tubes, sited at the end of the plate, pull the water through the

gravel, into the plate and out by the tubes. Air pumps or power heads are used to create the flow.

These have to be installed before anything else, and if it blocks up at all, it can lead to the tank being stripped out to rectify the problem. As the gravel acts as the filter media, it means that a large surface area is being used for biological filtration, but no mechanical or chemical filtration is being performed. Debris will build up in the gravel, so vacuuming on a regular basis has to be performed. This will prevent the system from blocking up.

One of the disadvantages of these is that debris and mulch can build up underneath the plate, the only remedy for this is stripping out the tank to give it a good clean. After a period of time the water flow will also slow down. Some designs are equipped to allow for reverse flow facilities, this can cut down on the amount of maintenance required as the water is pushed back through the gravel.

Sponge filters:-

These are the most basic filter available to buy, yet they are extremely efficient in mechanical and biological filtration. A piece of sponge is slipped over an intake tube; the water flow is then created by adding an airline into the tube. Many of the modern sponge filters will have ribbed or convex shapes to increase the surface area, this of course will then increase the biological load that the filter can handle. These are used mainly in breeding tanks (it prevents the fry from being sucked up into the intake tubes of other filters), and hospital tanks as there is no chemical filtration needed if medication is being added.

The only maintenance that is required for these is regular rinsing of the sponges in old tank water, as they tend to get clogged while they are performing the mechanical filtration. It is not advisable to use these in heavily stocked tanks unless they are there as a secondary filter.

Box filters:-

These are an old favorite of mine; I regard these as water polishers. They consist of a plastic box that is normally filled with filter wool and carbon. An air line supplies the water flow on the same principle as the under gravel and sponge filters. These are ideal for hospital tanks as they provide good mechanical and chemical filtration, this is ideal for removing medications that have been added. They cannot be used for biological filtration so a primary filter should be run alongside them.

Yet again the main disadvantage is that they will require cleaning on a regular basis, but this is a simple job to do.

External power filters:-

These are commonly known as hang on filters due to the fact that they simply

hang on to the back of the tank. There are chambers inside them where a choice of mechanical and chemical filtration media can be added. The biological filtration is provided by a bio wheel, this is basically a sponge mounted on an axle. As this spins it pulls water out of the tank via an uplift tube, once the water has passed through all of the chambers it is returned to the tank by a plastic chute. The biggest drawback with these is the size of the media chambers; they can only carry enough media for tanks up to 50 gallons with normal stocking levels. For some reason, these have never been very popular in the U.K., but are widely used in the U.S and Canada.

Internal power filters:-

Internal filters are used underneath the water level, ideal for smaller tanks , but they would not cope with larger set ups.They are smaller than the external power filters, this in turn means that they do not have the room for a lot of filter media. Most of the models that I have used only contain two sponge sheets for mechanical and biological filtration.

They are usually attached to the inside of the tank with rubber suckers, this can be used as advantageous, it means they will still work when submerged on their sides. Ideal for low water levels as in turtle tanks. Some keepers are not too keen to see them being used as they can spoil the look of the inside of the tank.

External canister filters:-

Canister filters are ideal for the larger aquariums (over 30 gallons), normally they are set up in the aquarium cabinets directly underneath the tank. They provide all 3 stages of filtration and can hold many different types of media depending on which biotopes you are running. This type of filter is advancing all of the time as suppliers are trying to bring out the best models. The media is stored inside a pressurized canister; most of the models also incorporate an auto close valve so that the actual housing can be removed easily for cleaning purposes. These are ideal in fresh water set ups but can cause problems if used with salt water tanks, they have the nickname of nitrate factories in that case. As the filter works away from the main tank it can have the side effect of reducing oxygen levels available for the beneficial bacteria.





Wet/dry filters:-

These are also known as trickle filters as the water is trickled slowly through the mechanical media, normally plastic bio balls, before it hits the rest of the filters media. They are definitely much better for the biological filtration than any other type of filter available. Due, to the complex structures of some designs, these are more suited for the advanced fish keepers, and often they are housed in sumps below the aquarium. More times than not, they are seen in use with large salt water set ups.

Fluidized bed filters:-

In these the filtration media is kept in suspension inside a clear chamber. Sand can be used in these for biological filtration as the suspension greatly increases the surface area for the bacteria to grow on. Mostly they are used for chemical filtration containing nitrate or phosphate removing media. They can cause problems when a power failure occurs as once the media settles the nitrates can spiral upwards.

Diatom filters:-

Diatom filters use a special media called diatomaceous earth. This is formed from the skeletons of uni cellular algae (diatoms). Their skeletons are formed with thousands of pores that trap the smallest particles in the water. These are the best mechanical filters you can buy. They will even remove parasites, microbes, and algal spores leaving the water crystal clear. As these clog easily they can only be

used as a secondary filter.

As any fish keeper will tell you, what filtration system works in one tank might not be as efficient in another. There are so many different opinions on which filters are the best; it certainly pays to chat with experienced keepers for their views.

- Smaller tanks do not need high powered filters to keep the water parameters at a high level; the flow rates of some of the larger systems would be too high for a small tank.
- If one filter is not handling the aquarium too well then consider adding a secondary filter.
- Always take into consideration that all three areas of filtration need to be covered-mechanical, biological, chemical. Testing your water at regular intervals will let you know if your filters are doing their job. Always try to go for the best filter that you can afford, skimping on this to save money can cost you more money in the long term.
- Stocking levels can affect which filters to buy; lightly stocked tanks will probably need less filtration as less fish waste is being produced.

I hope this article has helped somewhat in your decisions, but remember this is based on my views alone; other keepers will have their own.

AQUARIUM POWER FILTERS

One of the most important pieces of aquarium equipment, if not “the” most important, has to be a reliable filtration system to keep the water quality at its highest.

In the early days of fish keeping the choices of filters to use were basically one design, the under gravel filter (commonly referred to as a UGF). This was basically a plastic plate with holes in that sat under the substrate in the tank. It worked by air being driven into it by means of piping which created a water flow through the gravel, cleansing the water as it travelled.

Those days have long gone; there is now a wide variety of powered filters on the market that gives us much more scope to choose which system we wish to use.

There are basically 2 types of powered filter, an internal version, or an external one. So how do we know which one to use?

A lot of the decision involves the tank size that we have, but in some set ups it can also be influenced by stocking load or even if we want to create extra current for various biotopes.

The general rule is that for the smaller set ups an internal filter is sufficient for the tanks needs, as we progress to larger tanks then we should be considering upgrading to an external filter system. In fact the 100 gallon tank that I am running at the moment has 2 externals connected to it ,this gives me much better water quality plus I then have the option of adding a lot more choice of filtration media.

Internal Filters

Internal filters are fine for tanks up to 3 foot in length, after that I would definitely use an external filter. Internals are composed of a small housing chamber for adding sponges to; water is then drawn through the sponges by means of an electric impellor, the water is then passed out from the filter through a spout or with the addition of a small spray bar to slow down the speed of the current. They are attached to the tank with a bracket that will have suckers attached. This means that they can be placed anywhere in the tank, and at any depth. Most of the better internal filters will have an opening on the top for allowing air to be drawn in with the water; this will keep the tank well oxygenated.

Some models will have a lever on them to control the rate at which the filter will take in the water; this is useful if your tank inhabitants prefer more peaceful water flow. These can also be used alongside external filters if you wish to remove any dead spots in your tank, correct placement of the internal will add current that the externals cannot reach.

Disadvantages of using internal filters are that they can only perform mechanical and biological filtration in most cases as inside the housing there is only room for the sponges, no other media.

All of these filters will have a rating on them for the correct tank size to use them in, Fluval for example, have brought out the plus series (plus1, plus2, plus3, plus4), which means that looking at the model number you will get a good idea of which one you require.

Take for example the plus 1 model, this is rated for tanks holding 12 – 15 U.K. gallons of water, it has a flow rate of 50 U.K. gallons per hour.

As you move up to the plus 4 the tank size it can handle increases to 60 U.K. gallons of water, the flow rate increases to 260 U.K. gallons per hour.

Bear in mind that the smaller internals normally only hold one filter sponge, whereas the larger ones will take two.

External filters

These are the most advanced of the power filters. They comprise of a main chamber which will hold a number of trays or baskets that will contain the chosen media that is required for your system.

Water is piped into the chamber by means of an impellor. The intake is placed inside the tank and a length of tubing is then joined to it to create a connection to the main chamber.

The same applies to the outlet, this has a length of tubing which is fixed back to the tank where a choice of connections can be added to allow the water to re-enter the tank after filtration. The connectors supplied are normally a spout and a spray bar. The spout is used if direct water flow back into the tank is required, however if the current needs to be slow and gentle, then the spray bar should be attached. Basically this is a length of rigid tube with holes in it from one end to the other. As the water is passing through the holes, the return flow has no choice but to be slowed down.

I prefer the spray bar method, in all of my set ups it is placed level with the water surface so that ripples are formed to keep any oily film forming on the surface.

The media placed inside the filter is purely a matter of choice depending on which fish you are keeping. Sponges are a must for the mechanical filtration. Ceramic rings make a great host for the bacteria required for the biological filtration, as for the chemical I normally add phosphate and nitrate remover.

As with the internals most suppliers will do a range of different rated models depending on how much water you have in your tank.

A quick example is the basic Eheim range. The smallest external in this range is capable of a water flow of 390 l/h whereas the largest version is capable of a water flow of 790 l/h.

The Eheim professional range can also include built in heaters and UV sterilizers.

Basic Maintenance & Tips

When selecting your filter, remember after a period of time that the flow rate will decrease as the media starts to get clogged.

Take your time with the placement of filters; dead spots in your tank are excellent places for your nitrates to increase.

A good investment is a set of cleaning brushes for your filters. Every month or so your filter will need a good clean out. This includes rinsing the filter media in old tank water, checking the tubing for blockages, and another job often missed is

giving the impellor as good clean with a brush. This is not a complicated job as the impellor covers should either screw off or just click off, then it is just a case of sliding the impellor out carefully, making sure that the shaft does not get broken.

To replace the impellor, simply slide it back in, making sure that it has been inserted the right way.

There are many filters to choose from ,making your decision on which one to buy can be made a lot easier by researching first, some of the filters are not cheap items, it is best to make sure whichever one you do decide to buy will be right for what you need.

Once the substrate, heater and filter are installed we can move onto adding the hard décor. Many people find this the fun bit as they add tank ornaments or natural décor; this is where you can be at your most creative. The choice is endless for items to add to the tank but you must ensure that they are aquarium safe, if not they can leach toxins into the water.

As mentioned above biotopes are set up by keepers who want to stick to a theme with not only the décor but with the fish added as well.

At aqua-fish.net there is an article covering this topic:

Which aquarium biotope is the best one?

When I got my first aquarium, I didn't know anything about aquarium biotopes, good water conditions, fish species, plants, heating, etc. I didn't know which aquatic plants I can buy in order to reach good looking tank. You can easily imagine how it was...

As time went by, I found some sources on the internet and I started to plan changes. Like other people, I want to own nice aquarium too. Various plants can make your tank very attractive especially when you use them wisely. Many people consider using high aquatic plants in the background of their tanks and small plants in the foreground. It isn't bad idea, because it gives some kind of „depth“ to the aquarium.

Anyway, I decided to try something else. My aquarium has 81 litres with its measurements 90x30x30 cm. Everyone can understand, that it doesn't give large space to experiment with aquatic plants or fishes. But it creates very good basis for some creek based biotope. Stream is very important factor in creek biotope. Let's talk about creeks now...

Creek aquarium biotope

This biotope can be divided into „sub-biotopes“ by speed of water stream. When there is very fast stream, you will need to consider about fishes who like these conditions. In common, don't buy slow fishes when you have strong filtration (fishes like betta splendens, some tetra, discus, etc.). They won't feel good and will be hiding somewhere behind rocks or large plants. But not every creek has strong water stream.

Second option could be „plant factor“. Aquarium plants are the best way how to improve water quality! No matter what you buy in shops, no matter what do you read in many books. Many plants means many places to hide, good „natural filtration“, etc.

Aquarium biotopes with plenty of plants:

- 1) Southern African Swamp
- 2) South American Blackwater Stream
- 3) Southern Thailand Forest Creek
- 4) South American Clearwater Stream
- 5) Indian/Burmese River

When you use strong filtration, no matter if your tank is overplanted with plants. Fish would like these conditions, because it will bring a lot of oxygen without strong water stream.

Anyway, there are fishes who will love strong filtration! These fishes live mostly in Africa. The water in this habitat is highly oxygenated due to the turbulence created by the rapids. Short list of aquarium biotopes based on creeks with strong filtration:

- 1) African River Rapids
- 2) Northern Australia Rainforest Creek

Lake aquarium biotope

Lakes are very nice inspiration for aquarium. Unfortunately, it is harder to copy this biotope, because of its specific conditions. I wasn't trying to build this biotope on my own, so I won't give you any recommendation. Just take a look at links below.

- 1) Lake Tanganyika
- 2) Lake Malawi
- 3) Central American Rocky Lake

Back to the biotope in my aquarium

When I saw all of the biotopes above, I decided to change my tank into some „mix“ of them. I think it doesn't make any evil to my fishes and plants. You can see what I have done on the picture below



This photo was taken two months ago and Vallisneria is now everywhere. I love Vallisneria, because of its nice green color and it's propagation. You will need to find suitable plants for your aquarium when you want it to look perfectly. Vallisneria was the first reason why I wanted „mix“ of biotopes in my tank. The Second one was fishes. You can combine all peaceful fishes together and it still looks good. Why? Simple answer: Your fishes like good conditions, not specific plant of another fish. Whatever you do to your aquarium, don't forget about conditions in nature and goodness of all fishes in your tank.

Most keepers will see decorations that they like and add them to suit their taste. The decorations can take many forms like barrels, skeletons, castles and even old terracotta plant pots can be used, the choice is endless.

At aqua-fish.net there are articles covering this topic:

Fish Tank Decorations

What do I class as a fish tank decoration?

To me it's anything that is added to the outside or the inside of the tank to enhance the overall viewing of the tank. This can be anything that the fish keeper desires but there are some rules that need to be applied. The decoration must be inert if placed inside the tank, if it reacts with the water the parameters will be affected over a period of time, this could be detrimental to the health of your fish.

Any ornaments that are placed inside the tank must be aquarium safe. All of the

ornaments purchased from pet stores should be but it still pays to check as some of the cheaper ornaments may be painted with inferior paints that can leach toxins into the water.

All ornaments or décor must be cleaned and rinsed before they are placed in the water. If this is not done you could be adding potential diseases to the fish and contaminate the tank water. Do not add anything to the tank with sharp edges; they could injure your fish.

That is the serious side of decorating the tank but most of the above is common sense and decorating your tank can prove to be great fun. I have always found it is best to have an idea in your head of the finished tank, sketch it down on paper, then go out on a shopping spree to fetch the appropriate ornaments or hard décor. I have so often seen people buy ornaments here and there, put them all in the tank, then realize it just doesn't look right.

Themed tanks are great fun, natural looking tanks can look very beautiful if done properly, none of this is too difficult and there is plenty of choice out there.

The first item that needs to be added to the tank, even before the tank hardware is added, has to be the background. I have seen tanks with no background but hiding all the wiring can be a nightmare. Most of the backgrounds bought are supplied on a roll and cut to the length of your tank. There are many designs to choose from, a couple of examples are reef scenes, or planted scenes. I prefer to use plain backgrounds, even with this choice the color of the background can determine how well the coloration of the fish will stand out. Because of this I normally go for the rolls which have a different color on both sides, this will give you the chance to change your mind once the background is back at home.

After the background is chosen and fixed in place I would normally decide next on which substrate to use. The two choices we have is whether to use sand or gravel, but this still gives us scope to choose a variation of colors and gravel grain sizes. In some cases the gravel is used to buffer the water but I would need to write another full article to explain this so for now we will just look at its decorative purposes. Keepers will often choose gravel if they intend to keep plants in their tanks as it provides a good anchorage but if artificial decoration is to be used, then choosing sand will not cause any problems.

When deciding which ornaments or decorations are going to be placed in the tank I always think first of a main centre piece that will catch the eye straight away. When I say centerpiece I don't mean that it has to be placed directly in the centre of the tank, often it is more eye catching if placed to the side, but it needs to have a bit of a focal impact. I am not a great fan of artificial decorations but I have seen a tank set up with a massive shipwreck placed inside it and with all of the other pieces added it looked fantastic. Always try to pick decorations that match the

size of your tank, there is no point adding something that will take away all of the swimming space for your fish. Purchase ornaments that have holes in them to provide hiding places for your fish; this makes them functional as well as attractive. Even more functional are the ornaments that attach to airlines and release a stream of bubbles into the water. Treasure chests, skulls, whales, and sharks, there are too many of these to mention, but they are great fun to look at.

Every time you place some ornaments in the tank, stand back to make sure that they are sited correctly and the tank looks balanced.

Your choice of ornaments will also depend on the age group of the keeper who is going to look after the tank. There are many ornaments that are well suited for our younger fish keepers, this also includes the backgrounds. Cartoon characters, characters from children's television series, they are all available. For the more senior fish keepers there are many choices. I have seen tank set ups with a Roman theme in mind, in the tank ornaments of Roman temples, arches and ruins were included. This was very effective as the theme was used throughout and looked the part.

For a more natural looking tank set up, using rocks and wood is very effective. Wood can be siliconed together to create unusual shapes; even flat rocks can be silicones and stacked to create natural looking caves for the fish. In my opinion with any tank setup, plants are a must. Here again you have the choice of using artificial or live plants.

The newer ranges of artificial plants really do look realistic, more so when they are underwater. A little trick I learned is to add plants near the ornaments to blend them in, with a little practice it is even possible to get plants growing through the ornaments, this really does look spectacular. Some plants that do not have their roots submerged can even be attached to wood or ornaments and they will grow quite happily.

A fairly recent innovation to tank decorations is the submersible tank lighting. These use very low voltage bulbs and come in a variety of colors. Some of the models will even have the facility to connect to an air line as well. If sited correctly, they can illuminate some of your favorite decorations, adding more than one with a different color arrangement looks good. These lighting units are completely waterproof and safe to use.

I doubt very much that you will be happy with your initial layout of the tank, no-one ever is. Move things about and keep checking the result, eventually you will stand back and be pleased with the final result. It is easier to re-arrange your décor before the tank is up and running rather than trying to move things around when it is full of water.

Aquarium Decorations

Aquarium decorations come in many shapes and sizes and vary enormously in price. For the purpose of this guide, I will group them into several categories:

- Plastic and Silk Plants;
- Plastic/fibreglass ornaments
- Ceramic ornaments
- Novelty ornaments
- Decorative substrates
- Natural decorative ornaments
- Real plants

Plastic or Silk Plants:

Most of us have bought these type of plants, usually when we first start into the hobby. This is mainly because they are quick, simple and maintenance free. They also give you a finished result immediately. Some fish can be destructive too, and real plants don't last long in tanks with these fish. Goldfish are very well known for eating live plants and at best, uprooting them, so silk and plastic plants have their uses! As you become more knowledgeable, this type of décor tends to disappear in favour of natural plants.

Plastic/fibreglass ornaments:

A vast range of these are available covering everything from an ornamental bush and tree stump to castles, pillars, bridges and houses. They also come as anchors, ships, divers, treasure chests and many more varieties. The list is almost endless, and the prices are too! The sizes range from tiny to enormous so there is almost certainly one to fit your tank, somewhere on the shelf. They are very useful for themes in fish tanks, in conjunction with other decorations to create a pleasing effect. Many of them also have air attachments to increase the attraction, with moving water wheels, bubble streams or lifting shells to name just a few. If you are looking for something like this, be sure you have an air pump to power it!

Ceramic ornaments:

These are a little more select, and not so readily available in the local fish stores, but they are available at a price. Saying that, almost any ceramics will work in fish tanks! I have set up a village theme in my 125 gallon using ornamental tea pots! It became a real conversation piece and many of our friends complimented us on the originality of the theme. Other commonplace ornaments found in fish tanks are figurines and statues. If it is ceramic it's fish-safe, because the paint is sealed under the glaze and they are waterproof. I have used many ceramic

ornaments in tanks over the years and never had any problems. Just let your imagination run away and see what you can find!

Novelty ornaments:

I suppose a lot of the last paragraph could come under this heading, but so can many of the plastic and fibreglass ornaments! This group of decorations includes the skeletons drinking beer, the old man sat with his fishing rod, swimming divers, oyster shells that rise and fall, water wheels that turn, illuminated bubble-streams, and many more. This group is more for the kids than mature aquarists, but is aimed at giving movement in an otherwise boring tank, something to catch the eye and maybe start a conversation or just to create some interest.

Decorative substrates:

What sort of substrate would you use in your tank? It all depends on what else you have in there! Glass marbles look really attractive when used with a lovely ornamental castle, or on their own in a small tank with a few silk plants. Completely away from natural, but pleasant and different. Coloured gravel is also popular, with many different colours available to suit your tastes. I have come across people using fluorescent beads for substrate too, so their fish tank glows in the dark! (I sometimes wonder what the fish think of their home!) But everyone has their own ways of decorating their tank, and if that suits them, then why not?

Natural decorative ornaments:

This section relates to rocks, corals, driftwood, river stones and the like. These are normally easily obtainable either from your local store or your garden. Caution needs to be taken with these, as they need to be treated more carefully before putting them into the tank, mainly because they can carry disease or parasites with them. As with anything natural, make sure that they are thoroughly cleaned before introducing them to the water, and in the case of driftwood or logs, be sure that they have been boiled for a long time to remove the tannins, or you will end up with yellow water! A rule of thumb here is to boil everything before putting it in. (Corals are the exception if you have a marine tank. You actually want the inhabitants of the coral to survive!)

Real plants:

As you become more experienced in the hobby, the plastic and silk will surely be replaced by living plants. Once you start to realise that the aquarium is a closed ecosystem, you start to see the advantages of natural plants. They not only look 1000 times better than the silk counterparts, but they help to keep the waste products under control. These are the ultimate decoration when treated properly, but they can also be the biggest nightmare if they are not. As with any living thing, plants require basic minerals and nutrients to survive and they require light to flourish. When investing in real plants, care needs to be taken to ensure that

you match the type of plants with your aquarium conditions, and that you are prepared to look after them, in the same way as you would your garden. Remove dead leaves and trim regularly and feed them occasionally and they will thank you.

Whether you're a novice or an expert, with thought and flair your aquarium can be the centrepiece and a topic of conversation, and who knows, it could be a winner of competitions like the one available on this website too!

Aquarium Ornaments

Interesting under water scenes are created by using the right combination of aquarium ornaments. By choosing the right décor an aquarist can create the perfect environment to raise happy and healthy fish. Sure, aquarium ornaments are wonderful to look at, but they also serve a bigger purpose. There are many pieces that also function as important survival tools for aquatic pets. When choosing ornaments for an aquarium you'll have to assess the needs of your fish, pick features that accommodate those needs and use them to create an eye-pleasing scene.

There are so many different aspects of decoration to think about when building an underwater scene. Keep in mind you are creating a whole world for your fish to live in. It is a three-dimensional space where your pets will eat, breath, sleep and hide, so where do you start? The best place to begin is at the bottom.

The first thing to decide is what to put at the bottom of the aquarium. There are so many substances to choose from. Gravel is most commonly used to decorate the bottom of tropical tanks. It's easy to clean and it has a little bit of weight if you need to anchor down a few plants. Gravel comes in many different colors and textures to match any ornaments you may choose for your scenery. Adding larger river stones or marbles can increase the aesthetics and add dimension to plain gravel.

Once a substrate is chosen it is time to start looking for that perfect background. There are flat ones that are positioned in the back of the aquarium and there are three-dimensional ones that are placed on the inside of the posterior aquarium glass. Both serve the purpose of hiding the unsightly water filters that hang on the back of the tank. Choosing one is a matter of preference. But keep in mind that the scenery that hangs inside the water will be added to your list of aquarium cleaning duties.

The next step in aquarium decorating is the fun part and that is choosing the one or two dramatic pieces that will become the focus of your whole underwater scene. The fish will love it no matter what it looks like but be sure that it provides plenty of hiding space. These aquarium ornaments can be almost anything,

sunken ships, hollowed out logs, rocky caves, castles or houses, and the list goes on and on. Be sure to pay close attention to the size of these centerpieces in comparison to your fish and tank. You'll want to have enough space for hiding beneath it and also enough free swimming space above for your pets to move about. Once you have the big pieces picked you can go on to find smaller accessory pieces.

Accessory ornaments can be useful features added to your tank with specific purposes in mind. If you have active fish that require a little more oxygen you can look for underwater rivers and bridges or bubbling treasure chests. These decorations tend to need air pumps to power them and can take the place of a plain old air stone. Some fish appear to have fun when swimming through turbulent waters and this is a good way to provide such currents. Another type of functional ornament is the submersible light ornament. This type of decoration provides a soft glow in the aquarium, just enough to see in without the powerful, bright light of the aquarium hood. These lighted features often come in different colors to enhance the tones of the tank.

The final step in aquarium décor is choosing the right plants. This will be the final touch of personality and color in your aquarium. Decide whether you want a lot of plants or just a few. If you plan to raise larger fish it would be best to use just a few as they tend to rearrange the things they can move. If you raise smaller fish you could probably use more plants so the tank appears fuller. Then you need to decide whether you want to use real or plastic plants. Again, with the larger fish you should choose the more durable plant which is plastic. If you have smaller fish it doesn't matter which you choose because they can't hurt real or fake plants.

Once you've chosen all of your aquarium ornaments you may need to rearrange the layout a few times before it's absolutely perfect. Just keep trying until you get it right and your fish will love you for it.



This is my daughter's aquarium with colorful rocks and plants, glass marbles and a bubble blowing diver.

By aqua-fish.net, downloaded from <http://e1.aqua-fish.net/show.php?h=aquariumbook>; **Unauthorised use strictly prohibited!!!**



A cave made of river rocks vs. a plastic rock cave



Plastic plants



Plant Background



Larger stones give plain gravel added dimension.

One thing I have learned through experience is that when adding the décor it is better to stick to natural or stick to artificial decorations, when the two are mixed it just doesn't work.

There is even a choice of which types of plants can be added to the tank i.e. live plants, silk plants or plastic plants. This is also a matter of choice and nowadays many of the artificial plants look so realistic it is very hard to tell the difference.

Live plants are more beneficial to the tank as they will soak up nitrates from the water so this will benefit the fish and often reduce the amount of water changes that are required.

The advantage of using artificial plants is that they never need pruning or cutting back. This makes for easier maintenance when trying to keep the tank looking tidy.

The following articles will go into more details on the plant choices

Why have a Planted Tank?

There are several reasons for wanting real living plants in your aquarium. To start with, plants can help the environment in the tank by removing the nitrates from the water as well as oxygenation, help to reduce algae growth and they look good as well.

Artificial plants have their uses too, but real plants, well tended and arranged well can make an aquarium simply stunning!

Before you decide on whether to go for a planted tank, check that it is the right option for you. Are the fish you will have in the tank going to eat or uproot the plants? What type of plants do you want? Is there enough light for the types of plants you want to grow. Is the substrate suitable for plants? Do you have enough time to tend them? What about CO₂? Will you need to feed the plants? What about cleaning the tank after it's planted? Can you get the right plants to make it look good? There are many factors to consider achieving a successful planted aquarium.

Let's look at this subject from the top:

What types of fish are best suited to a planted aquarium?

You need to research this very well, as a mistake here can ruin all your hard work. Goldfish are well known for ruining plants, as they love to eat the roots, so are not

suitable, and many other species will cause damage to plants as well. So the first stage of planning is what type of fish.

So you have chosen some fish to go into the aquarium, now,

What type of plants do you want?

With a vast range of plants available, you will need to select a combination that work well together both for appearance and also environmental aspects. It will not work if you choose some plants that need very strong light, combined with plants that need a lot of shade, unless you can create the shade in the tank. There are also colour considerations and the overall effect that you want to achieve is very important.

Ok, the plants are chosen, so,

Is there enough light?

Your tank may look bright and well lit, but the lighting is crucial to plant growth, and it has to be the right type of lighting. Here you need to consult the various sources online and in shops to find the correct lighting for your tank, the right power output, the right frequency range and maybe you'll need to change the number of fittings you have too! Lighting is another common cause of failure.

Is this starting to look expensive? It can be, so budget carefully. Fish, plants, lighting, all arranged, what's next?

Is the substrate suitable?

You now know what plants you are going to use, so now you need to choose the substrate for them. Some will be happy with gravel, others will need special aquarium plant substrate such as Flourite, some may need sand, yet others could need a compost base. Research is the key all the way through this. Once you know what plants you are looking at, the substrate needs to suit them. Bear in mind that some plant substrates can be very expensive, so choose wisely.

Are we getting the idea yet? A planted aquarium is not just a matter of throwing a few plants in and letting them get on with it. Many people term this now as aquascaping, and it has become something of an art. You can spend a little or a lot, depending on the final effect you want, but it's not to be hurried in any event!

Do you have enough time to tend them?

Why should plants need to be tended? Remember that an aquarium is a closed environment. In there, many things can make a difference to the quality of the water even to the extent of polluting it so much that the fish die. Rotting leaves and plant matter are a big source of pollution in aquaria. Tending the plants is simply making sure that any dying leaves or stems are removed promptly, not left to rot, and making sure that the plants stay healthy and looking good. One plant

can take over the tank very quickly, while others take time to grow, so one of the tasks is to keep everything in balance during the growth, and maintain that balance in maturity.

What about CO₂?

All plants need carbon dioxide to photosynthesise and grow. In the tank, plants only have a limited amount of CO₂ in the water to work with. The more plants you have, the more need there is for CO₂. CO₂ is a difficult gas to keep in suspension in water. It escapes from the surface even with the gentlest current disturbing the water, and is very difficult to get back into the water again. It cannot be bubbled in like oxygen, it has to be absorbed slowly through long time contact with the surface or forced in through a reactor. There are many DIY methods of adding CO₂, as well as some very good commercially produced systems. Most of the time, this is something that is added after the aquarium is finished and growing, so just keep it in mind for later on.

Will you need to feed the plants?

Most plants need food to grow. Some of the food comes from the fish waste, but other nutrients will still need to be added occasionally. This really is part of the tending of the plants, so it will become part of that routine, but still needs to be considered.

What about cleaning the tank after it's planted?

How can you clean the tank when it's full of plants? The simple answer is, carefully! A gravel vacuum doesn't work very well when there are roots and plants growing out of the gravel, and with other substrates you can't use this method either. Cleaning the bottom of the tank if you over-feed your fish can be very difficult and take a very long time. If you get the balance right, it's not necessary very often, which makes it easier.

Can you get the right plants to make it look good?

This depends on what your local supplier can supply or whether you can get them online or from other sources. Most local stores that stock plants don't know a great deal about them, so always go in ready with the answers and know what you're looking for. Be careful that the store doesn't try to sell you something that is not suitable for your needs too, as they will tend to try to push what they have, rather than what you want.

So, you've made up your mind that you want a planted tank. But having made all the choices and planned everything out, you now need that tank in the corner of your living room, which is already full of fish! Can you build the aquarium with it stocked? Not a chance! You have to move the fish, drain the tank, clean it out and then make a start, or else buy a new tank, stand and everything else to go with it, and find room to put it! Welcome to the world of MTS (Multi-Tank-Syndrome!)

Ok, so let's assume you have got everything worked out and a tank to work with. Now you have to put it all together and get it to look like you planned. First off, add the chosen substrate, background, rocks, ornaments, air features, filter, heater and lastly, the water! It's gone all cloudy! Yep, you need to let the water settle and the substrate return to the bottom so that you can see what you're doing at the back of the tank! After about a week or so, the water still isn't clear, so you turn to chemicals to help, like filter-aide to settle the dust.

At last! The water is clear and you can see the bottom. Now for the plants. Add them just as you planned, leaving room for growth, of course. When you have finished putting the plants in place, you stand back and admire..... nope, not right.... Move a couple around, check again, and so on until you have roughly what you're looking for. It will look quite sparse to start with, since the whole aim is to grow plants, not to plant enough to fill the tank straight away!

Add a little plant food and a little fish food and get the cycle underway. You can't just add the fish to a new tank, it has to do the nitrogen cycle first, but you all know that already, don't you? This is the first chance you get to see your plan in action. The lights are on, the water clear(ish) and the filter running. At this stage it is not difficult to move things around and re-arrange. Leave it a couple of weeks and the roots start to take hold, then it becomes much more difficult. While the tank is cycling you have the opportunity to fine-tune the décor.

The tank is now cycled and the plants are going.... Yellow! What's wrong now? Remember I mentioned the CO₂ earlier, this could be a good option now! It could also be a case of things not being right for the plants, maybe the light is not on for long enough, or for too long, maybe it's just not bright enough for the depth of the tank, or maybe it's just the roots settling in before the plant greens up and grows. There could be several reasons for the plants not looking their best, these are just a few and you have to look to eliminate them one by one.

But at least you can start to add the fish now, and the tank is really looking something like you want. Only time and experience will take it from here. You have to nurture the plants and tend to them, care for them and then love the results. Nature has a way of surprising us all at times, and many times it's been the planted aquarium where nature does work miracles.

You have probably spent a whole month or more putting this together, many hours of work, lots of money, and for what? You can end up with a complete failure, or a stunning display tank with fabulous plants and a full complement of fish to really show your skills.

Is there a trick? No

Are there any guarantees? No

Is there a secret? No

Is luck involved? Most definitely!

Why You Should Consider Plastic Aquarium Plants for Your Tank

Adding decorations to your aquarium can be almost as much fun as putting the fish in the tank for the first time. Adding plants to your aquarium can be a very cost effective way to spruce things up a bit. Plastic plants are inexpensive, and require very little maintenance or care once they are placed in the aquarium.

The idea of adding plastic plants has made many aquarium owners shudder. At one time plastic plants were considered bulky eyesores added by novices to make their aquarium look better. You didn't have to have a magnifying glass in hand to be able to tell that the plants weren't real, all you had to do was look at them and there was no doubt.

Aquarium plastic plants today are nothing like what they once were. They can look so real, that you have to actually touch them to tell that they are plastic. These plants are made more realistic by the fact that many are made of silk, which allows them to move freely within the water.

One benefit that aquarium plastic plants give is that they shine in all their glory as soon as you place them in your tank, whereas live aquatic plants take time to grow and blossom. It is important that before you place any aquarium plastic plant in your tank that you give it a quick rinse to remove any contaminants that could possibly harm your fish. To help make the plants even more realistic you can soak them in warm water for about thirty minutes, which helps soften the fabric.

Plastic aquarium plants require no extra care, you don't have to purchase special lighting, no supplemental nutrients, and they can be placed in any aquarium substrate.

You can design freely using plastic aquarium plants; your only limit is your imagination. Choose any plant that you like, and place in anywhere you wish inside your tank. If you don't like it once you place it, simply pick it up and move it to a new location until you do. You don't have to worry about choosing plants that can live in your tank, aquarium plastic plants work in freshwater or saltwater tanks. Choose whatever plants you prefer, and place them anywhere you wish. Yes, it is that simple!

In the event you notice that your plastic aquarium plants need to be cleaned, simply remove them and rinse them off, or you can soak them in a cleaner made

just for plastic aquarium plants. No matter what cleaner you decide to use, if any, make certain that it is safe for your fish.

You cannot kill your plastic aquarium plants. You do not have to prune them, feed them, or sing to them to make them grow, and they will always be there unless you decide to remove them. Once you make the initial purchase, you will never have to spend money on them again, unless you decide you want new ones.

Many fish tend to eat live aquatic plants, meaning that you either have to be very careful when purchasing plants for your aquarium, or have to constantly spend money replacing them as they are eaten. The worst thing that your fish can do to your plastic aquarium plants is to uproot them, or knock them out of position, which you can easily fix in a matter of seconds. They are not harmful to your fish in any way, and in fact they help make the fish more comfortable in the aquarium environment.

Anytime that you introduce live aquarium plants into your tank, you risk the safety of your fish who already live there. Live plants may be infested with pest or parasites, or may have been treated with chemicals that could be harmful to your fish. With plastic aquarium plants, there is less chance of contamination, therefore reducing the risks to your fish.

Plastic aquarium plants do not change the water quality in your tank. They don't release oxygen or carbon monoxide, so you don't have to worry about having to monitor water conditions more closely as with live plants. Live plants tend to serve as a breeding ground for algae to grow, causing you to have to work much harder to keep your tank clean and safe for your fish. Live plants also can cause ph imbalances in the water because they suck oxygen out of the water during nights and away from the fish.

You don't have to worry about the cleanliness of your aquarium water with plastic aquarium plants as you do with live plants. Live plants tend to wither and rot, which has a major impact on the quality and cleanliness of the water in your tank.

As you can see, plastic aquarium plants add a life like appearance to your aquarium, while maintaining the safety of your fish. They are easy to care for, just clean them once in a while and enjoy. There is no need to monitor water quality more closely, no need to worry about excess algae growth, or having to remove dead or wilting plants from the tank. Plastic aquarium plants are a convenient, fairly inexpensive way to add your own decorative touch to your aquarium tank.

When arranging the décor in your tank you will never be satisfied the first time you add everything, it is best to keep stepping back a few paces, take a good look and move things

about until you are completely satisfied. Always leave a gap between the ornaments/décor and the tank glass, this will make it so much easier when it comes to cleaning the tank glass with sponges or scrapers and when performing cleaning of the substrate with a gravel vacuum.

Once you are completely satisfied with the way the tank looks it is time to start filling the tank full of water. Make sure that you add conditioned water, adding the correct amount of water conditioner as per supplier's instructions. This needs to be done carefully, if you pour it straight in it will disperse the substrate soiling the effect that you have spent all that time creating. I have found the best way of doing it is to place a plastic lid or an old saucer on top of the substrate and pour the water onto them carefully. When the tank is half full they can be removed and the water poured directly into the tank.

When the tank is full, the filter can be switched on and the heater needs to be turned on to the required temperature that the fish you intend to buy are happiest in. With most tropical setups this will normally range from 24-26 degC (75-78 deg F). The water needs to heat up but as it does keep monitoring the temperature to make sure that the heater is set correctly, this can take many hours so the best way is to fill the tank in the evening and then check the temperature the next day in the morning. Adjust the heater up or down as required.

3. What are the most common problems before/after setting up a new tank?

There are many problems that can be encountered when first setting up a new aquarium, especially if it is your first one. As mentioned in previous chapters, research has to be done so that the strict guidelines can be followed in preparing your set up.

One of the first problems that can be encountered happens when the tank arrives and that perfect space that was allocated for it just isn't big enough to fit the tank in. This can easily be avoided by careful measuring of the available space and then re-measuring to make sure your figures are accurate. Write down your figures and take them with you when you go to look at all of the different tanks available. All of the leading brands of aquarium manufacturers will supply brochures with exact measurements in them for their range of tanks. Remember to always allow room around the tank for maintenance and cleaning of equipment and the tank itself.

The tanks should always be filled up outside before they are positioned in the house to check for leaks, water spilling out onto your patio or garden will make less mess than if it is pouring all over your best room carpet. When the tank has been filled leave it to stand for several hours just to make sure before you empty it and move the set up into the house.

With second hand tanks a common problem is that they are sometimes set up without being cleaned properly. Who knows what was kept in the tank before you bought it, there may be toxins lurking in there that could affect any future inhabitants and lead to untimely deaths. Always clean out and rinse any tank before setting it up.

Believe it or not some initial problems are caused by the tank stand itself. If it is a DIY stand it needs to be able to support the weight of the tank above, the weight of the water is very heavy, to look at a tank it can be misleading how much weight is there but as most of us know a full tank is almost impossible to move. The framework of the stand needs to be able to support the tank evenly. Below are two articles for you to read on the subject of aquarium stands.

Things You Should Know Before You Purchase an Aquarium Stand

Nothing sets fish owners apart more than the manner in which they display their aquarium. You can always tell a proud fish owner by the materials and quality of the aquarium stand which holds their aquatic investment. Aquarium stands are

available in many sizes, shapes and price ranges.

Although most aquarium stands are for fish tanks that are 20 gallons or more in size, there are stands available to hold aquariums from 10 gallons on up. There are several styles of aquarium stands, from the simple rack style, to the more robust cabinetry style. Materials are also varied, as the bigger the fish tank, the sturdier the stand materials must be.

Rack style stands are usually for the lower gallon sized tanks, and are made of light metals such as aluminum. The racks for larger fish tanks or for double tank display are made from sturdier steel construction with welded joints.

Next up the line in stands is what is sometimes referred to as aquarium furniture. These stands can house the aquarium, or have it placed atop the stand, depending on model chosen. These aquarium stands are made primarily from wood and wood products. Almost any décor can be matched when using this type of stand, as they can be attained in almost any style and color. Types of wood construction available are solid wood, Medium Density Fiberboard, and a mixture of the two.

Solid wood construction has all solid wood, with none of the components made of a fiber composite wood known as Medium Density Fiberboard, or MDF. None of the panels on the aquarium stand can be made using MDF to qualify as solid wood construction.

Stands which are constructed using MDF are often times simply referred to as fiberboard construction. These units will have little if no solid wood components. These stands can be very attractive, and can match the décor of most any home because they are available in a wide range of veneers. These veneers will match the existing furniture because they are real wood, which is thinly sliced. If you have a room with mainly oak furniture, then an oak veneered aquarium stand will match perfectly. The advantage to using fiberboard construction is mainly the cost. MDF units will always be cheaper to purchase than their solid wood counterparts.

Mixed construction can have more than one meaning. One such assembly would be that the sides, front and top are made from solid wood, while the back, flooring and drawers would be made of MDF. It could also mean that the main construction is done in MDF, with the front and drawer fronts made from solid wood. Each manufacturer will have its own definition of mixed construction, so do your due diligence. It's always in your best interest to ask the salesperson about how the aquarium stand is constructed before you purchase.

For those who have very large aquariums, an aquarium stand alone just won't do. This is where the wall aquariums come into play. These units are built either into the existing wall, or are used as a wall themselves. Units which are incorporated

into existing walls are fully wired for lighting and offer a large viewing area. This type of aquarium construction can be made to be viewed only from one side, or on both sides.

Aquarium stands which are large enough to use to define home space are not only visible from both sides, but in some cases, they may be viewed on one or both ends depending on the type of construction. More times than not these are saltwater aquariums, and this type of unit is very costly.

Here are a few aquarium stand tips:

- 1) You'll want to consider where the aquarium will be placed. Be sure to measure and consider the viewing height before you select and buy your stand. The standard height in stands is in the 30 inch range, unless you opt for a custom built stand.
- 2) Although wood is the most expensive choice for your aquarium stand, it will be the sturdiest. Wooden stands are usually made from hardwoods such as oak. Wood has the tendency to hold up very well under heavy weight, and will not suffer damage from water as easily as MDF.
- 3) When purchasing a wooden aquarium stand, check for precut holes to allow for ease of installation. If you find a unit you like that doesn't have precut holes, ask if they can be cut prior to delivery.
- 4) Most metal aquarium stands are made from either steel or iron. If choosing a stand for a saltwater aquarium, don't choose metal as it will suffer rust damage if it gets wet. Metal aquarium stands also usually don't come with storage space to hold and conceal aquarium supplies.
- 5) Cabinet style aquarium stands are more stable and provide more storage space than regular stands.

By keeping these tips in mind, hopefully you will purchase a stand which will not only display your aquarium nicely, but also provide the storage needed, and look good in the process.

DIY Aquarium Cabinets

When purchasing a tank, we also have to take into consideration the cabinet; would it look right in our house etc., indeed in some cases does it actually match the tank that is sat on top of it. A lot of money can also be saved if we bought the tank alone and created our own cabinet.

This is not such a daunting task as it seems, even a basic cabinet can be made with

the most basic of wood working skills. I have created a couple of cabinets in the past that were very pleasing to the eye and believe me I am no carpenter.

There are a few options that can be used, one of the most basic stands can be achieved using breeze blocks (cinder blocks) or even using house bricks for the stand columns and lengths of wood across the top for the actual tank support. In this case for quickness and strength I have used breeze blocks stacked and cemented 3 or 4 high, (depending on the finished height you require), and I laid 3 strips of 4" x 2" wood across the top for support. Please bear in mind that wherever you are going to house the finished set up the floor underneath must be capable of taking the weight involved when the tank is filled.

On top of the wood I also added a sheet of 1" thick polystyrene to cushion the tank and to rule out any vibrations. This design may not be the best to look at but it was built in 30 minutes (remember to allow the cement to harden overnight), and I attached a curtain around the front to improve the appearance.

Another option is to either purchase a metal box frame or get one welded together to your specifications, then this can be covered with either tongue and groove pine wood or in my case I normally use 12mm marine ply. Now if you plan the size of your cabinet with some thought you can apply the sides and back if required cut to size if using the marine ply, then go to a DIY store to purchase standard size cabinet doors which can then be fitted to the front, this will then give it a more aesthetic appearance.

The last option, as mentioned earlier, is to actually create the whole cabinet yourself from wood. Not as difficult as it sounds.

DIY aquarium cabinet

Before you do anything, draw a detailed plan of what you are making and the size, length of materials that you require. I always use 4"x2" planed wood for the main frame, this gives a good strength and with it being planed makes it look that bit more professional. Start by making the front and the back of the cabinet, these comprise of a wooden rectangle for each-the height being basically the viewing height required, and the length being the length of your tank plus say 1 cm(0.5 inch) to allow for any last minute adjustment of the tank.

Depending on the length being used, I then add into the rectangles a supporting beam halfway across (for longer cabinets I would add 2 supporting beams).

Cross beams will then join the front to the back. These are cut to the width of your tank, plus an additional support beam in the middle of the sides. In all of my wood joints I used counter sunk decking screws as these seem to be the strongest ones I could find. As added security for heavier tanks I add metal right angle brackets

onto the inside of the corners, these really do make a difference.

Now you will have a basic frame that is the length and width of your tank. The hardest part has been done.

All that is left to do is add the casing for the frame on the sides and back. Depending on which you choose (in my case marine ply, for water retention purposes), this needs to be attached with counter sunk screws, this time I used 1 inch wood screws and plugged the top of the screws with plastic caps for neatness.

As already written for the front I added pre made cabinet doors which were attached with the appropriate hinges, purchased from the same timber store.

A full sheet of ply is added to the top of the cabinet and at this stage I perform the ultimate test for strength of my work piece. Stand on it to make sure it is sturdy enough for the job, with the larger cabinets I have even had 2 people standing on it.

If it has passed that test then add a sheet of 1 inch polystyrene for the reasons explained above, now we are very nearly there.

With all of the joins etc. there are bare edges on the corners of the cabinet, with these I simply added some pre-molded trims purchased from the same timber store, just to give it that professional finish.

The cabinet can now be stained or painted to suit yourselves and you have saved yourself a lot of money in the process.

A little tip I did learn was that if you take your plans to the timber stores, in many cases they will pre cut all of your beams and sheeting for you.

One very important aspect of setting up your tank is to ensure that everything is level, if the tank is slightly tilted, not only does it look like a bit of an eyesore but the water pressure on the tank glass will be greater where the tank dips and this can cause problems very quickly as the glass could crack and then eventually break altogether. Place a spirit level on the stand before the tank is placed on top and then check again once the tank is in position.

The same rules about weight bearing also applies to the floor below the tank, to prevent the tank from “sinking” make sure that the flooring is strong enough to carry the weight and if not it will need reinforcing.

One great problem that has been reported many times may seem obvious but it happens time and time again. When the tank is placed onto the stand make sure that there are no foreign objects left on top of the stand or if a DIY stand has been constructed, make sure that screw or nail heads are not left protruding above the flat surface. These will apply direct pressure to the bottom glass when the tank is full of water and it will crack. Always check that the surface is level, place an aquarium mat or a sheet of polystyrene onto the tank stand and then place the tank on top. Not only will this protect the bottom of the tank but it will absorb any vibrations from outside which could spook the fish and make them stressed.

The only exception to this is with the floating tank systems where the cabinet has a specially designed bracket for the tank to sit on (most common are the Jewel Aquariums), never place anything between the bracket and the tank glass.

The tank and stand are in place and everything looks o.k. surely there can't be any more problems to avoid, believe me there are. The equipment added to the tank has to be fitted according to the instructions provided and rushing through this will cause problems in the future.

If you are using an external canister filter make sure that the lid is clamped down properly and the sealing ring is in good order. Check the piping carefully when you first switch it on to make sure that there are no water leaks. Most canister filters have special threaded adaptors for gripping the pipes but some don't, the pipes simply slide over a tapered joint, in this case I have found it best to add a small jubilee clip or something similar to tighten the joint.

Heaters are often incorrectly placed in the aquarium and quite often they have been switched on out of water causing them to fail, never switch them on unless fully submersed.

A good tip is to always check the electrical equipment for short circuits, the last thing you want is a shock off the tank when you are doing a water change.

Once you are happy with the way that you have set everything up and all looks well it should be easy from now, other problems kick in when the tank is first running, it happens to everyone until the tank matures but many of them should be short lived if dealt with correctly.

I have had a lot of people asking me for advice on their tanks when they are first set up, the most common question is “why has the water gone green” and they are in a panic. It is not a pretty sight when you have spent a lot of time setting up your tank but is a common occurrence while the tank is cycling. It is always caused by either an algal bloom or a bacterial bloom and will disappear as quickly as it came once the filter starts running efficiently.

At aqua-fish.net there is an article covering this topic:

CLOUDY WATER IN AQUARIUMS

One of the most common problems aquarists have to deal with is cloudy water. Whether we are talking brand new set ups, tanks cycled tanks running for a few weeks or established mature tanks at some time or another I have keepers asking me why this has happened.

Hopefully this article will explain a few of the reasons, how to combat the problem, and how to prevent future occurrences of this problem.

New set ups:

We have just arrived home with our brand new tank, gravel or sand, and some nice shiny ornaments. Everything has been put in the tank and the water has clouded up.

One cause of the cloudiness could be part of the cycling process as the tank water will be unbalanced, but when the cycling is complete it should clear itself, but more of that later.

A must when setting up the tank is to rinse thoroughly the gravel or sand being added as if this isn't done it will create cloudiness when the water is added. Not the nicest of jobs, but necessary. Add the substrate to a bucket, cover with clean water, give a good swirl & empty the murky water. Repeat this process till only clean water is in the bucket, now the substrate can be added.

The ornaments must be aquarium safe; if not they can leach toxins etc. into the water. Always rinse these before adding them to remove any alien coatings or debris on them.

Bogwood etc. will release tannins into the water unless it is pre-soaked for a couple of days, changing the water as you go. The tannins will give the water a yellowy appearance.

As these tannins are acidic in nature these will also affect your pH therefore giving an unnatural balance.

The water in cycling tanks undergoes a lot of changes so at some stage it will be probable that cloudiness will occur, once the cycle is complete the water will clear itself, in some case this can happen overnight.

Cycled tanks:

Our tank has now cycled, been running for a few weeks, we have added fish, plant etc. but for no reason the water has gone murky. This could be due to decaying plant matter, overstocking the tank, over feeding the fish. The reason for the murkiness will most likely be a bacterial bloom caused by the factors mentioned. Another reason could be nitrates, phosphates being added into the tank on water changes, test your water and if this is the case then a water purifier like an HMA filter or an RO filter might be needed to keep your tank water clean.

If keeping plants look for leaves rotting, remove them before they foul the water. The general rule for stocking fish is one inch per gallon of water, go over this and your filtration system may not cope, therefore it will not remove the bacteria from the water effectively.

Fish only have small stomachs, it is better to feed small amounts 2 to 3 times per day, rather than one large meal. Any uneaten food should be removed from the tank if possible, try to clean the surface of the substrate on a regular basis with a gravel cleaner etc., occasionally remove the ornaments for a clean.

Do regular water changes, remember small regular changes are more beneficial to keeping your water stable, rather than large ones done every now and again (I do 10% changes weekly). All of this will help to prevent bacterial blooms in your tank. I have mentioned nitrates & phosphates; these can give you green water as well as incorrect tank placement, leaving the lights on for too long a period.

Green water is caused by algae being present, you may need to add phosphate/nitrate remover to your system to combat this, eliminating the algae food source, or even restrict feeding the fish to every other day. Check the food you are giving to the fish as some actually have phosphates in them so change the brand you are using.

Is your tank place in direct sunlight for part of the day, how long do you leave your lights on for? Sunlight will promote algal growth as will the lighting. Lights should never be run for more than 12 hours and if you are running them for less try reducing the time even more to clear the water.

Keep you filtration system clean, don't let it get clogged.

If suspended particles are causing the discolouration try adding filter wool to your filter to trap them, but this will need replacing on a regular basis.

Nitrates over a period of time will rise in your water; the only way to reduce them is by regular water changes.

There are several additives that are available to add to your system for water clarity, these are known as flocculants. they work by clumping the suspended debris together, which then allows the filtration to pull them out of the system.

But remember, these are only a short term solution to the problem; in fact overuse of these can create more problems by altering the balance of your water.

Cloudiness can also be caused by fine air bubbles in the suspended in the water, normally after water changes, these should disappear in a couple of hours.

To summarise keep your tank and equipment clean, do regular water changes, don't overfeed the fish, and do not overstock your tank.

Follow these rules and you should have a thriving set up with superb water clarity.

Other forms of algae will start to cover the tank glass and décor while the tank is settling down, once the water has balanced and everything has settled down, algae should disappear unless something is wrong with the set up.

At aqua-fish.net there is an article covering this topic:

Aquarium algae

(types, and how to get rid of them - natural and other ways)

Green algae

There are over 7,000 species of green algae, most of them being unicellular or filamentous freshwater species. Brackish and marine species also exist, so green algae can live in such aquariums as well.

Green algae are often a beneficial part of the ecosystem in the aquarium and should ideally not be vigorously eliminated. It can for instance serve as food for various inhabitants and help you keep the water quality stable by binding organic waste. There is however situations where you need to do something about the green algae, e.g. when it suddenly starts to grow much faster than normally.

If you wish to control green algae growth in the aquarium, you need to control light and nutrients. Green algae carry out photosynthesis and will therefore grow

much faster when provided with plenty of light. Ideally place your aquarium in a spot where it receives no direct sun-light and do not let the aquarium lighting be on for more than 12 hours per day. When it comes to nutrients, it is important to carry out regular water changes and avoid over-feeding. Also consider keeping the aquarium well planted, because algae and plants will compete for the same nutrients.

A lot of aquatic creatures are fond of eating green algae and it shouldn't be hard to find a species that suits your specific aquarium conditions. Fish is not the only alternative; there are for instance many snails that love to feast on green algae.

Last but not least, manual cleaning can be helpful when you wish to get rid of green algae that grow on aquarium glass, equipment, and so on. You need to be persistent, because the algae will soon reappear again after being removed, especially if you don't do something about nutrients and light.

Blue green algae

Blue green algae are known under many different names, including blue-green algae, blue-green bacteria, and cyanobacteria. Blue green algae belong to the phylum Cyanobacteria in the domain Bacteria, but this special type of bacteria is capable of carrying out photosynthesis just like algae and higher plants. This is why it is commonly referred to as algae even though it is actually a type of bacteria.

Blue green algae is found in fresh-, brackish- and marine waters and is therefore capable of living in all sorts of aquaria. It doesn't even need a body of water to survive and can for instance be found growing in soil and on moist rocks in the wild. This makes it possible for blue green algae to colonize parts of an aquarium that is not submerged, only moist. Some species live inside other organisms, e.g. protists, sponges, lichens and plants.

Blue green algae can fixate its own nitrogen and exist even in well kept aquariums, but excessive blue green algae growth is typically a sign of high levels of nitrogenous waste products in the water. Check the levels of ammonia, nitrate and nitrite, carry out regular water changes, and avoid over-feeding. Also make sure that biological and mechanical filtration is functioning properly.

In severe cases, it can be necessary to add 200 mg of erythromycin phosphate per 10 gallons of water. This should ideally be combined with vacuuming and meticulous scrubbing of glass, equipment and plants. Before you use erythromycin phosphate, keep in mind that it will affect desirable bacteria in the aquarium as well and can wreck havoc with the biological filtration. You might have to add new beneficial bacteria to the aquarium afterwards.

Brown algae

Brown algae are also known as gravel algae and silica algae. Excessive brown algae growth is usually a sign of high levels of silicates and nitrates in the water, light insufficiency and/or low levels of oxygen. Unlike many other types of algae, brown algae are therefore not combated by reducing the amount of light that reaches the aquarium. Brown algae typically grow in the form of brown patches on glass and other surfaces in the aquarium. It is especially common in newly set up aquariums, particularly in those where the substrate emits silicates. Silicates can also enter the aquarium through the tap water if it is high in silic acid.

To combat brown algae, start by testing the water to see if it is high in nitrates and/or silicates. If necessary, use silicate adsorbing resin in the filter. Carry out frequent water changes and avoid over-feeding to lower the amount of nitrates in the water. Increase lighting, vacuum carefully and wipe off all surfaces. If your tap water is the problem, you can start using RO water instead.

If your aquarium is newly set up, the problem can actually take care of itself as green algae start competing with the brown algae for nutrients. Including live plants in the set-up is recommended since they will compete as well.

Otocinclus and Plecostomus are both known to eat brown algae.

Hair algae

Just as the name suggests hair algae form long strands of “hair” in the aquarium and can become a nuisance for the inhabitants. This type of algae can grow really fast and can sometimes be visible only hours after a thorough aquarium scrub.

Excessive hair algae growth typically occurs when you allow the levels of nitrate to exceed 10 ppm in the aquarium. Check the water quality, carry out frequent water changes, and avoid over-feeding. You can for the hair algae to compete for nutrients by keeping the aquarium well planted.

Many well-known algae eaters refuse to eat hair algae, so make sure that you pick a suitable species if you wish to enlist the help of algae eaters to combat hair algae. Also keep in mind that many species only eat young hair algae. Be prepared to remove old hair algae manually.

Hair algae are typically introduced to the aquarium by piggy-backing on plants, invertebrates or equipment. It can grow slowly in the aquarium for many months without being noticed and then suddenly cause an algae explosion when the nitrates increase.

String algae

String algae is not the name of a certain genus or family; the term is used for all sorts of algae that grow in the form of strings, including so called blanket weed and pond scum. It can grow attached to a surface or cover the water's surface.

A common remedy against string algae in ponds is to add barley, e.g. in the form of barley bales or barley extract. Be careful, because barley is not suitable for all aquariums. You also need to be patient; it can take quite a long time before any effect can be noticed. String algae can also be combated by limiting its access to light and nutrients, and by forcing it to compete with live plants in the aquarium.

Just like hair algae, string algae are known to enter the aquarium attached to new plants, invertebrates and equipment.

Source: Algae and algae control section at AC Tropical fish.

Another problem that occurs with a newly set up tank is that the fish are introduced before the tank has cycled (this subject will be dealt with in more detail in chapter 4). As I always insist on if research has been done properly, the fish will be introduced to the tank at the correct time and the correct amount. This saves a lot of heartbreak seeing the new arrivals die off quickly. Add the fish slowly a few at a time so that the filters can keep up with the extra waste that the fish are producing. The key to successful fish keeping is patience!!!

For new fish keepers it can be difficult until a routine is worked out. Feeding the fish and the correct amount to feed is usually a problem to begin with as the fish always look hungry, don't be fooled and stick to regular feeding times, never ever overfeed the fish.

At aqua-fish.net there is an article covering this topic:

Food and feeding aquarium fish

This article answers the most common questions regarding feeding your aquarium fish, and also offers answers about food for particular species. All questions have been asked by visitors of Aqua-Fish.Net. If your questions aren't answered on this website, then contact us and we'll try to help you. Before you do so, make sure that you used the site search (see top-left corner on this page).

How much should I feed my fish?

In various guides you can find something like "the amount of given food should be eaten in 1-5 minutes". The number which replaces 1-5 is usually different for each guide. Anyway, I feed my fish differently... Firstly I put flakes into the

aquarium in order to feed fish which swim in the top or middle levels. As flakes sink (they float for a few seconds – up to one minute, depending on water flow), they get to the bottom levels where bottom-dwellers start eating them. At this time usually all fish except bottom-dwellers are full. Now it's time to put some granules and tablets into the tank (foods which fall down immediately). Since bottom dwellers have to find food, they will search for it for more than one or two minutes in general (unless you keep so many fish that they eat all food very fast).

It is also good to keep snails in the aquarium since these habitants can eat all uneaten food, thus they prevent such food from decomposing and causing pH to get lower.

Always check if all fish are eating during the feeding time! In my experience 1 small Tetra can eat between 4-5 normal-sized flakes (1cm²) at once. On the other hand, foods such as bloodworms or larvae are more tasty and fish will accept more such food.

What is the best time to feed my fish?

For fish, it's nearly always. Avoid feeding during night, or when lighting is turned off. I feed my fish in the morning (at about 0800 o'clock) and in the evening (at 1900 o'clock). If you just brought new specimens into your fish tank, they will learn when it's the feeding time very fast; usually in 4-5 days after being introduced into their new environment.

Fish are more active when they're fed, so if you want to see them swimming here and there, feed them. However, do not overfeed.

How and where can I buy discount fish food?

Getting discounts is very easy when you're shopping in small aquatic shops (not big stores!). Depending on how many fish you keep, and what is the warranty on bought food (some foods must be consumed in 1 month, some in 3 months, etc.), always buy as much as possible. When you're buying bigger amounts of something, it is likely that you can get a discount. Of course, firstly ask the seller if he/she's willing to offer you a discount if you buy more than expected!

What is Spirulina and how it helps?

Spirulina is a great addition to algae eaters and herbivores, and is classed as a high protein diet as it consists of 60% vegetable protein that is very easy to digest and obviously contains no fat or cholesterol that is contained in meat. Since there is already an article devoted to this topic, feel free to continue reading here:

SPIRULINA FISH FOOD

One of the most eagerly accepted foods that are given to herbivorous and algae eating fish has to be spirulina fish food. Malawi fish, plecs, snails will pounce on this food as soon as it is offered in the tank. It is available as flake, pellet or wafer making it a good choice for any size of fish.

Most of the prepared flakes or pellets will have traces of spirulina in the food; it is such a great additive to the food as it is recognized as a health booster as well as being full of protein. It is even being recognized now as a good additive to include in the human diet but what makes spirulina so special.

What is Spirulina?

Spirulina is actually a cyanobacterium, more commonly known as blue-green algae, and is a very small botanical algae; only growing up to half a millimeter in length.

It is a free floating cyanobacterium that can be found in lakes with an extremely high pH and very hard water. These lakes are to be found in Africa, Asia and South America. The name Spirulina derives from the spiral structure of the algae as it twists round like a spiral staircase.

Use of spirulina as a food stuff goes right back to the Aztecs who would call it by the name of "Teocuitlatl", which translated means stone's excrement. This will be explained later in the article. It grows wild in Lake Chad where the locals still make it into cakes and use it as an additive for their soups. Flamingoes in the African Rift Valley lakes filter spirulina from the water as their main diet; flocks of these birds are sustained as the spirulina is so easily available in these waters. It is a very active reproducer so spirulina stocks are never really exhausted.

Spirulina is classed as a high protein diet as it consists of 60% vegetable protein that is very easy to digest and obviously contains no fat or cholesterol that is contained in meat.

It does however contain essential minerals and fatty acids that will boost the immune system of the fish. Unlike other algae, it is extremely easy to digest as it is composed of soft cell walls that are made from complex sugars and protein, using these algae should prevent a lot of the digestive problems that some fish suffer with when offered other greens or other algae.

The main benefits of feeding spirulina to your fish are:-

- Feeding spirulina will increase and give a more uniform growth rate for your fish.
- Spirulina will improve the digestion of your fish; more nutrition is also extracted from the food as there are no indigestible components.
- Spirulina will boost the immune system of the fish, it will also aid in the prevention of swollen abdomens due to blocked intestinal passages.
- Spirulina will enhance the production of special enzymes that break down digested fats into energy rather than letting them build up in the fishes body.
- It has been proven that spirulina will bring out the coloration of your fish better; this is due to the carotene pigments that are found in the algae.

Spirulina is commercially cultivated to meet the demands of the market. This is achieved by using open channel ponds with paddle wheels to agitate the water. The main spirulina farms are to be found in the United States, Thailand, India, China and Pakistan.

The long term benefits of feeding spirulina in the fish diet has certainly passed on to the human diet, there are millions of people all over the planet who are regularly taking spirulina tablets to aid their immune systems, there is even ongoing research that it may well help control cancerous cells in the body, but obviously this still has to be proven.

Some interesting facts:-

- Spirulina contains vitamin B12, this is normally only found in animals, and spirulina is only one of a handful of plants that contain it.
- Spirulina is very large for a single celled plant; it is 100 times larger than most other algae and can be seen with the naked eye.
- It reproduces so fast that harvesting these algae will supply industries for years, when a colony forms, they will adhere to each other to form one large clump, and this makes harvesting very easy.
- Spirulina is related to sea kelp but it is not a salt water plant itself, it thrives in very warm water (even up to 60 deg C) with a pH between 8.0 – 11.0.
- Certain spirulina species will still survive even when the lake or pond has evaporated, it will turn into a dormant state, its appearance will be a frosty white and as the cell structure turns into sugars it will have a very sweet taste, this is where the Aztec phrase “stone excrement” comes from.
- It is believed that the manna mentioned in the bible was actually dried spirulina as it was described as wafers made with honey, and it appeared on rocks that were found by the Israelites.
- As spirulina grows in environments that no other organisms can survive, it is found in a very hygienic state as there are no other organisms that will pollute the

water around it. Therefore it can be classed as the most sterile food to be found naturally.

- Some scientists believe that it is on the link between plants and animals. It does not have the rigid cell walls that are found in nearly all plant life, and the cells do not contain a nucleus. It still needs sunlight and chlorophyll to produce energy so this brings it back to the plant genera.
- A close relative of spirulina is chlorella but this algae is much more plant based, its cell walls are very hard and indigestible unlike the easily digested spirulina.
- All in all any keeper that decides to use this algal plant for feeding their live stock can only be on a winner, it has been used for many years with excellent results.

How long can fish live without food?

The answer is different for each species. Big cichlids can usually survive a few weeks, up to months sometimes. Coldwater fish such as Koi don't need any food during Winter (although you can feed them during this season). And some livebearers will not survive a week without being fed. In my experience Angelfish, Gouramis and Bristlenose catfish can easily survive a week without food (Bristlenose catfish will probably find some algae anyway).

Bear in mind that rather than leaving fish without food, you should buy an automatic feeder. If you're not leaving for more than 48 hours, then all fish should survive.

What is natural fish food, and what are advantages and disadvantages?

In order to make your own natural fish food, it all depends on which fish you're going to feed. For instance, if your goal is a live food (larvae for example), then simply put some dead carp into the river for a few days. Then return and you should find plenty of larvae in the fish' body. Your fish will love this food (if your tank's inhabitants are carnivores or omnivores). Another way of feeding your fish is finding larvae in puddles. Of course, this is possible during Summer, not during Winter. Another way how to make your own natural fish food is having a temporary tank which you fill in with water from other fish tanks, and then just let it be for a few weeks. Add some fish food there, also some sponge from filter. In a few weeks you should get tubifex in the tank. Occasionally tubifex can be seen in already running fish tanks too. These are examples of natural live food, however the disadvantage is that these foods can bring diseases into your aquarium. The advantage is that it is relatively easy to raise these larvae, and fish love them.

For herbivores, algae is the best natural food. In order to achieve high levels of algae, it is necessary to use more lighting than recommended, and also make sure

that fish won't eat all algae at once. In simple words, algae must grow faster than they're eaten. There are no disadvantages of using algae as fish food. Advantages include, but not limit to, allowing newborns to find an easy food source, and also algae helps to keep water chemistry within acceptable intervals by decomposing harmful chemicals.

Can too much live food cause the dropsy disease?

No. In fact, even a small amount of live food can cause the dropsy disease. Especially if fish are weak. It all depends on the fact if the food is infected. Actually, if food is infected, then any disease can be introduced into the tank.

Is leaving uneaten frozen food in the aquarium bad?

No. Generally speaking, no uneaten food should be left in a fish tank, however one cannot assure that all food was eaten at once and that no small piece fell down to the place where it won't be found. Uneaten food will decompose and this doesn't mean any danger at all.

In order to avoid this situation, keep snails. Ramshorn snails are cool for this purpose, although they produce a lot of excrements. If you're not familiar to snails, keep bottom-dwellers such as Cories or Catfish.

Can be beef heart used as fish food?

Yes, although it is not recommended to use it too often. Beef heart isn't usual food for fish in the wild, and it can also introduce diseases into the tank. Many fish love beef meat as a whole, but in general it's similar to human. Many people like fat foods, ice cream, and whatever unhealthy. No matter how it tastes, unhealthy food is still unhealthy. Rather feed your aquarium fish ordinary foods than look how fish get fat and sick.

How do fish collect food?

Each fish' mouth is orientated to some direction. For example, Betta fish use to take their food from surface, thus their mouths are orientated to the surface. In comparison, Cories and Catfish use to collect food from bottom, so their mouths are orientated to the bottom.

In general, fish' mouth cannot be the only factor when you're deciding what food size they can accept. In many cases mouths are bigger than the rest of their digestion system. It is easy to find out if food is too big; Fish spit the food if it's too big.

It may take a couple of weeks to work out the correct number of hours that your tank needs for lighting. If you have a planted tank you may find that the extra lighting required

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will also bring on an onslaught of algae, gradually reduce the lighting hours every day until the tank reaches the perfect balance of healthy plants and no algae.

What we need to remember is that it does take time for a tank to settle down and the problems will reduce the older the tank is, don't expect to cure all of the problems straight away, tackle the worst problem first and eliminate them one by one!!!

4. The tank is running, What now?

The tank is full of water and all of the décor and equipment is installed. Next step will be adding fish- or is it?

The tank is not ready for fish yet as it needs to be cycled i.e. the filters need to have built up their colonies of beneficial bacteria to convert any ammonia present in the water into nitrites and then nitrates which are removed through water changes. This is what is meant when people talk about tanks “cycling”, it is a short term for the nitrogen cycle in the aquatic world.

Basically ammonia needs to be added to the water to start off the cycle, this can be done by my favourite method of dropping a frozen prawn into the tank and letting it decay. This will create the ammonia needed to feed the bacteria required in the filter. Some keepers will cycle their tanks by adding a couple of hardy fish to produce the waste. Nowadays it is also possible to purchase bacteria cultures which will do the same thing and instantly add bacteria to the tank.

Be wary of products that claim they can cycle a tank instantly; this is not always the case. Cycling can take anything up to 3 weeks to complete, in my eyes this is when fish should first be introduced to the tank. The water will need to be tested on a regular basis with the appropriate test kits for ammonia, nitrite, and nitrate levels. Only when the ammonia and nitrite levels are zero is it safe to add your fish. The test kits are available to buy from any aquatic store and are very simple to use.

At aqua-fish.net there are articles covering this topic:

Aquarium bacteria

When an aquarium is first set up it is incapable of supporting any livestock until it has built up large enough colonies of beneficial bacteria that will convert all traces of toxic ammonia and nitrites into nitrates that are removed during water changes or consumed by plants that have been added to the tank. But what are these beneficial bacteria and how do they keep our aquariums healthy?

To understand the processes that are taking place in the aquarium, we have to first learn a little about water chemistry and what it involves. We have heard the phrase “cycling the tank” but what does that mean. When we first set up an aquarium we are actually setting up an artificial ecosystem that hangs on a fragile balance. If we get everything right then the tank looks great but if the balance tips against us and the water parameters take a dive we will start losing fish.

The phrase “cycling the tank” refers to the nitrogen cycle that is being created in our small ecosystem i.e. the aquarium.

A new tank has just been filled with water, the filter has been switched on and the water is up to temperature, the only missing factor is the bacteria that will inhabit the filter, live in the substrate and even cover the tank ornaments and tank glass. The nitrogen cycle will now start to be created. Fish waste will always break down to create ammonia in the tank water, this is highly toxic to the fish so the first stage of the nitrogen cycle is to slowly build up a colony of “nitrosomonas bacteria” to break down the ammonia into nitrites. These bacteria are found naturally in all water but in very small concentrations, nowhere near enough to cope with our tank. They are lithotrophic bacteria that can only survive on clean, hard surfaces such as the media in filters, and as stated previously, tank ornaments and tank glass. As well as needing a food source from the ammonia they also require an adequate supply of oxygen to thrive and multiply. To obtain a large enough colony of these bacteria in our aquariums there are a couple of methods that we can use. Fishless cycling is where drops of pure ammonia are added to the water to feed the bacteria or we can lightly stock the tank with a couple of fish to provide the ammonia from the fish waste. Decaying matter and uneaten fish food will also break down to produce ammonia but this can also affect the overall water quality. Whilst the colony is expanding it is quite common to experience bacterial blooms in the water as the nitrosomas bacteria are free floating and consuming the ammonia present. The water will take a milky appearance but once the colony has established itself the water will clear. Algae may also appear all over the aquarium as ammonia is also a food for this micro organism.

Our colony of nitrosomas bacteria has now grown large enough to deal with all of the ammonia present; it has now been converted to nitrites. These are less toxic to the fish but still dangerous. Another colony of bacteria will start to grow in our filters and aquarium to convert the nitrites to nitrates. These are the nitrobacter bacteria. They will do the same job as the nitrosomonas bacteria except they will deal with the nitrites. They too need food from the nitrites and oxygen to thrive so this must be provided by the fish keeper. At this stage the ammonia will be almost non-existent but do not be tempted to add any more fish. All this will do is increase the ammonia level again and this will in turn slow down the multiplication of the nitrobacter, they can only thrive at low ammonia levels. Once the colony has established, your ammonia levels and nitrite levels are almost at zero, this is what you are aiming for. Nitrates have risen but these are kept under control with water changes, even if a reading is showing on your test kits they are not immediately toxic to your fish.

In our filters and aquarium there are now thriving colonies of nitrosomas and nitrobacter bacteria, now we have to look after them. As stated earlier, they need oxygen to thrive. This is why the filters should be rinsed on a regular basis to prevent clogging. This should only be done with old tank water as fresh water will

wipe out most of your established bacterial colonies.

The bacterial colonies are always on a constant balance with each other; this is why too many fish should not be added to the tank at any one time. Upsetting the balance of the bacterial colonies can result in mature aquariums going through mini cycles where the nitrosomas bacteria need to rebuild to control the ammonia levels to prevent them from stunting the nitrobacter colonies.

There are bacterial cultures that are available to buy which are supposed to “kick start” your filters. At the moment there are two schools of thought as to their usefulness, some keepers are praising them but some keepers are doubting the ability of suppliers to bottle a colony of bacteria and provide them with enough food, oxygen etc. to keep the colony alive until they are used.

We have covered the beneficial bacteria, what we must be aware of is that harmful bacteria can enter the aquarium and thrive in places like the substrate if the gravel or sand is not cleaned on a regular basis. These harmful bacteria can bring diseases and infections to your fish so every precaution must be taken to eliminate their introduction. They can be introduced by your hands touching the fish food, tank maintenance when your hands are in the water, lack of tank maintenance allowing a build up of detritus in the substrate and even in the water. Washing your hands prior to tank maintenance and feeding will help - do not use soap as this can affect your tank water!

Quarantining any new fish that are to be added to your tank will allow you to spot if they are infected before they are added to the tank, there is nothing worse than one infected fish wiping out all of your stock.

Aquariums and Ammonia, Nitrates, Nitrites

The nitrogen cycle is the process in which ammonia is converted to nitrite which is then converted to nitrate. This progression is made possible with the presence of ammonia and nitrite converting bacteria with the end result being a chemical compound known as nitrate.

Cycling:

When setting up a new aquarium it is important to first complete a thorough cycling so that the beneficial bacteria needed for ammonia and nitrite conversion can be established. In a mature aquarium it is important not to over clean the bacterial environment to maintain a healthy level of nitrogen cycling. Once nitrifying bacteria is present it can begin to metabolize the harmful ammonia produced by decaying plants, uneaten food and decomposing fish waste.

Process:

As previously stated ammonia is produced by decaying plants, uneaten food and decomposing fish waste. One group of bacteria's purpose is to convert the ammonia by binding it with water and the resulting chemical is nitrite. This is when another group of bacteria does its job. They take the nitrite and bind it with water forming the chemical nitrate. The presence of ammonia and nitrites are extremely toxic to fish while nitrate levels are less toxic unless harmful levels occur. By using a master test kit found in any aquatic retail store, you can test your aquarium water levels to check for the presence of these harmful chemicals. Frequent partial water changes can help prevent nitrates from collecting in harmful amounts in the aquarium.

Master test kit



pH levels:

The pH of aquarium water can affect ammonia levels greatly. Water will contain two forms of ammonia: pure NH_3 and the ammonium ion NH_4^+ . Ammonia in its pure chemical state is more toxic than the ammonium ion, but both still pose a threat to the lives of your fish. Highly alkaline water contains higher amounts of pure ammonia while slightly acidic water contains higher amounts of the ammonium ion. The difference in the chemistry of the two substances is minuscule but the effects can make all the difference in the health of your fish. It is a known fact that ammonia poisoning is more common at high alkaline pH levels.

Ammonia:

Ammonia (NH_3) is a chemical that is highly toxic to fish even in small amounts. Ammonia toxicity causes severe stress to fish making them more susceptible to disease and death. This chemical also causes damage to gill membranes and inhibits normal respiratory function. It is important to test the aquarium regularly for this chemical; once a month if your tank is healthy but more often if there are signs of sickness or death. When using a testing kit ammonia traces should be undetectable in your results. The test results are measured in ppm or parts per million and your results should ideally read 0ppm. If any traceable amounts are present there are ammonia converting chemicals that can be found at aquatic retail locations. This chemical doesn't remove ammonia from the water but it helps to

convert the highly toxic form into a less toxic version allowing it to be oxidized through a bio-filtration system. Carbon can also be used in the filtration process to help remove ammonia to improve water quality. It is important to check daily to see if your filter is clean and running properly. If a filter gets too dirty or breaks down it could result in the presence of toxic ammonia in the tank. Take special care to not over feed the fish not only for their well-being but also because this is important in aquarium maintenance and filtration care. Do not overstock the aquarium because more fish mean more waste. When using medications be sure to test water levels because bacteria can be sensitive to foreign chemicals resulting in the inability to oxidize ammonia. It is important to clean the aquarium regularly but it is also very crucial to remember not to over clean the bio-filter. This mechanism plays an important role for the bacterial population in the aquarium, without which the nitrogen cycle cannot take place.

Nitrite:

When the ammonium ion (NH_4^+) is mixed with water the beneficial bacteria can then convert the ammonia into nitrite (NO_2^-). Much like ammonia, nitrite is also toxic and can be harmful towards fish. If traces of nitrites are in the aquarium it can cause severe stress to the fish. This leads to respiratory hardship and a weakened immune system, which makes the fish more susceptible to disease and death. To prevent this from happening you must be sure to test for nitrite periodically just as you would for ammonia. When testing for ammonia, having a result of 0ppm is not an indication of what your test results should be for nitrite or nitrate. It is very important to test for each substance individually as part of your routine aquarium maintenance.

Nitrate:

When the substance nitrite (NO_2^-) mixes with water the beneficial bacteria can then convert the nitrite into nitrate (NO_3^-). This substance called nitrate is seemingly harmless towards fish but in higher concentrations it is not. Unlike ammonia and nitrite, nitrate can be present in the aquarium as it usually is to a certain extent. In the past it was believed to be harmless towards fish but studies show that the over concentration of this chemical in the aquarium can have adverse effects on the health and wellness of fish. If there is an over abundance of nitrate in the tank it could be an indication that there is too much fish and plant waste. If not dealt with properly, this problem will inevitably lead to diseased, unhealthy fish. Another consequence of too much nitrate is algae. Nitrates promote the growth of algae which can result in a cloudy tank with increasing amounts of the toxic ammonia and nitrite. This is why it is so important to test for nitrate even though it's ok to have a slight amount in the aquarium. Your nitrate test results should be 40ppm or less, the lower the better. If your nitrate test results show that excessive amounts are present there are several ways to remove enough nitrates for the aquarium water to be safe once again. Partial water changes should be performed at once if the levels are exceedingly high. A tap

water filter can be used to remove all chemicals from the water including ammonia, nitrite and nitrate. If this does not produce satisfactory results you might want to try a nitrate removing filter.

Fishless Cycling:

As stated before, aquarium cycling is a very important step in starting a new aquarium. Without the beneficial bacteria present to break down ammonia and nitrite the first tank residents will most likely not survive. A method called fishless cycling was created to start new aquariums without risking the lives of the first fish to live in it. This method is also a quicker route to forming the much needed bacteria. It takes up to three weeks instead of up to 6 weeks. When a tank is set up pure ammonia is added to the water. Additional doses of ammonia are added each day and daily tests are done to monitor ammonia levels. Once the bacteria for breaking down ammonia is established you'll see the ammonia test results quickly drop to 0ppm. Continue adding slight amounts of ammonia daily to give the nitrite levels a chance to go up. The presence of nitrite will bring about new beneficial bacteria whose purpose is to deal with the conversion of nitrite to nitrate. Once the water test results show traces of nitrate, do one more partial water change, wait awhile and then test again for ammonia, nitrite and nitrate. If the results of the tests are favorable you are now ready to stock your tank with new fish. The new fish waste will be the source of ammonia needed to continue the nitrogen cycle.

Tips on how to safely clean your aquarium:

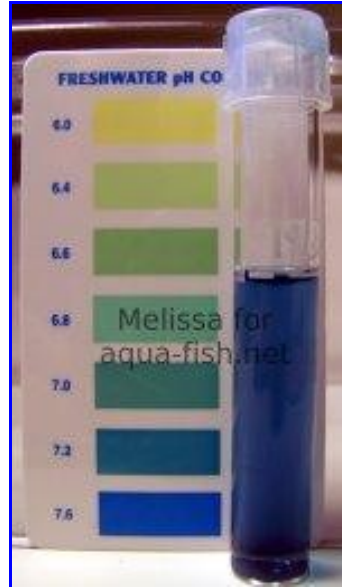
Once you have established a colony of beneficial bacteria you do not want to harm it. Cleaning your aquarium is essential to the good health of your fish but keeping all of those good bacteria is just as important. This is why it is essential to do partial water changes. Keeping some old water in the tank at all times will give the bacteria that are still present a chance to multiply and replenish. Full water changes will wipe out too much of the bacteria which may allow a spike in ammonia and nitrite levels resulting in possible death. Another important thing to remember is not to use any cleaning chemicals that do not specify safe for use in aquariums. Bacteria are very sensitive to chemicals and you would not want to kill your colony of beneficial bacteria. If you need to clean any filter cartridges, it is a good idea to rinse them in the water removed from the aquarium because this water already contains the bacteria.

Water test results:

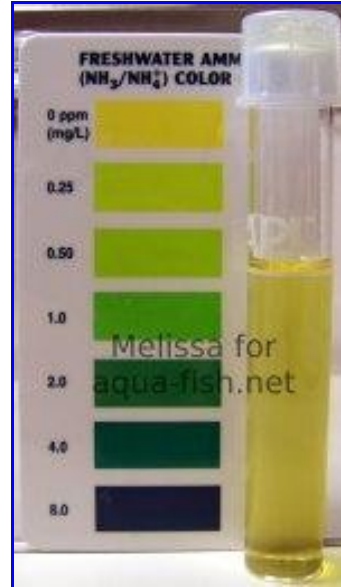
I used two different aquariums to perform a series of tests on. The test results show the difference in pH, ammonia, nitrite and nitrate levels of a healthy tank to an unhealthy tank. Here you can see what the test results of an acceptable tank looks like versus the test results of an unacceptable tank.

In “tank A”, partial water changes were performed every 3 days, the fishes were fed as recommended on the food label and the tank was not overstocked with fish. The pH, ammonia, nitrite and nitrate levels were tested and the results proved it to be a healthy tank.

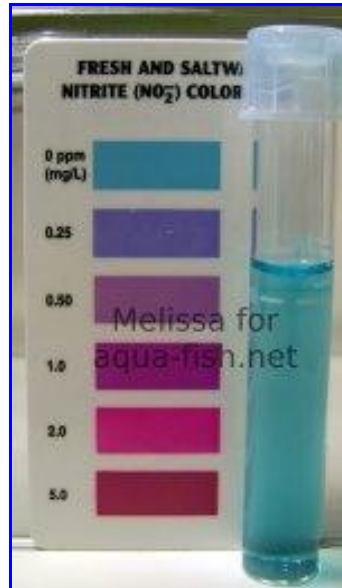
Tank A



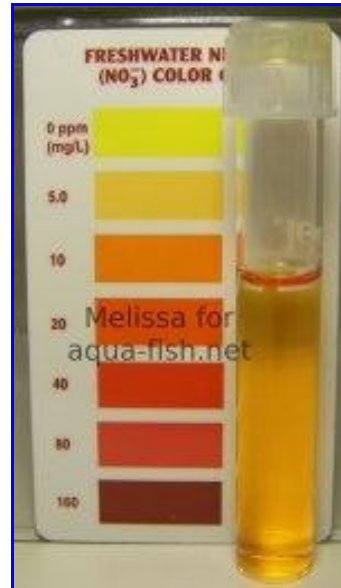
pH level 7.6



Ammonia level 0ppm



Nitrite level 0ppm



Nitrate level 5ppm

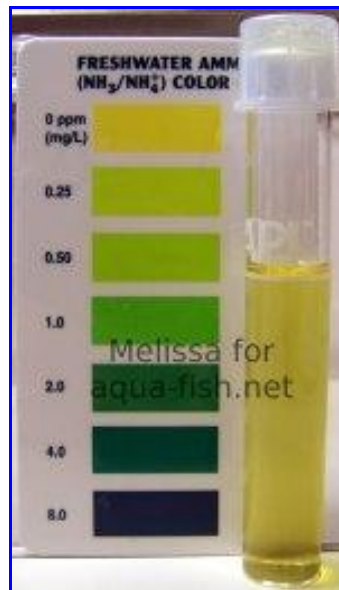
In “tank B”, no water changes were performed for 2 weeks, the fishes were overfed according to the recommendations on the food label and the tank was

overstocked with fish. The pH, ammonia, nitrite and nitrate levels were tested and the results proved to be unhealthy by the recommended standards.

Tank B



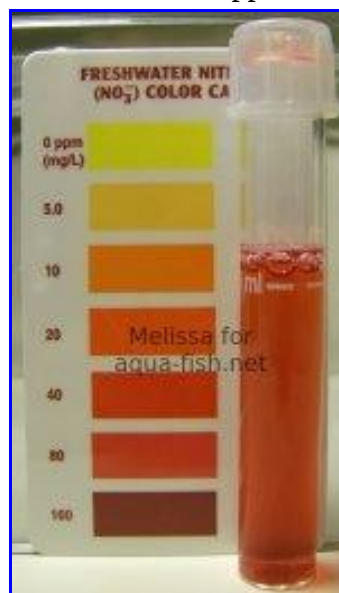
pH level 7.0



Ammonia level 0ppm



Nitrite level .25ppm



Nitrate level 50ppm

	Tank A	Tank B	Optimum levels	Analysis
pH	7.6	7.0	Between 7.0 and 7.6	The pH levels for both aquariums are within the acceptable parameters.
Ammonia	0ppm	0ppm	0ppm	The ammonia levels for both aquariums are at the acceptable level.
Nitrite	0ppm	.25ppm	0ppm	Tank A is healthy and has no detectable nitrite. Tank B shows the presence of nitrite which is not acceptable. Immediate maintenance should be performed on tank B.
Nitrate	5ppm	50ppm	Below 40ppm	Tank A is healthy and contains nitrate within acceptable parameters. Tank B contains levels which exceed the acceptable amount. Immediate maintenance should be performed on tank B.

Using a master test kit in your regular aquarium maintenance routine can prove to be very useful. By detecting harmful chemicals early you can take action to prevent unhealthy conditions in your tank. Doing what is necessary to maintain healthy water levels in your aquarium will allow you to enjoy the company of your fish for a long, long time.

Ammonia test kit

The most toxic of the nitrogenous wastes that can build up in aquarium water is Ammonia (NH₃). Ammonia, once it reaches a certain concentration in the water will cause the fish to become increasingly unwell, and if the presence of ammonia in the water is allowed to remain undetected for a protracted period, it will eventually cause the fish to die. Ammonia in the tank is generated constantly as the organic materials present break down. The fish in the tank also metabolically produce ammonia which they excrete through their gills. Concentrations of ammonia in the tank as they increase will gradually cause the fish's gill to become blocked and reduce their ability to absorb and maintain the desired quantities of oxygen in their blood.

The cycle of life in the tank is very finely balanced, with bacteria in the tank's

filter utilizing ammonia as a source of energy which will cause the ammonia to become nitrite. Bacteria, in a different form, will use the nitrite to turn it into nitrate, which is harmful to the fish in the tank. The nitrate needs to be removed or at least diluted on a weekly basis, by removing around a quarter of the water in the tank and replacing it by water after dechlorination.

If the dilution of the water is not being done properly, or in too distant time frames, the ammonia levels in the water will gradually increase, and the fish in the tank will begin to display the earliest signs that things are not well with their health. The fish will begin to appear more frequently near the surface of the tank, and begin to gasp. This is a sign that they seeking oxygen intake. If the fish in tank lie motionless at the bottom of the tank, then this as sign that their natural survival instincts are telling them to conserve energy. Their breathing will be heavy and labored. These are signs of distress that any experienced aquarist will never witness as they simply will not them allow to occur.

Experienced aquarium operators, either in a domestic or a domestic application, will, as part of an overall maintenance program, will have an ammonia test kit as an integral part of their equipment, and will use them on a weekly basis to ensure that there are not traces of ammonia present in the water. This is a very important point that many less experienced aquarists fail to grasp, till it is too late.

There is no such thing as an acceptable level of ammonia present in water in an aquarium. Any measures taken such as changing water need to be a preemptive measure and not as an afterthought.

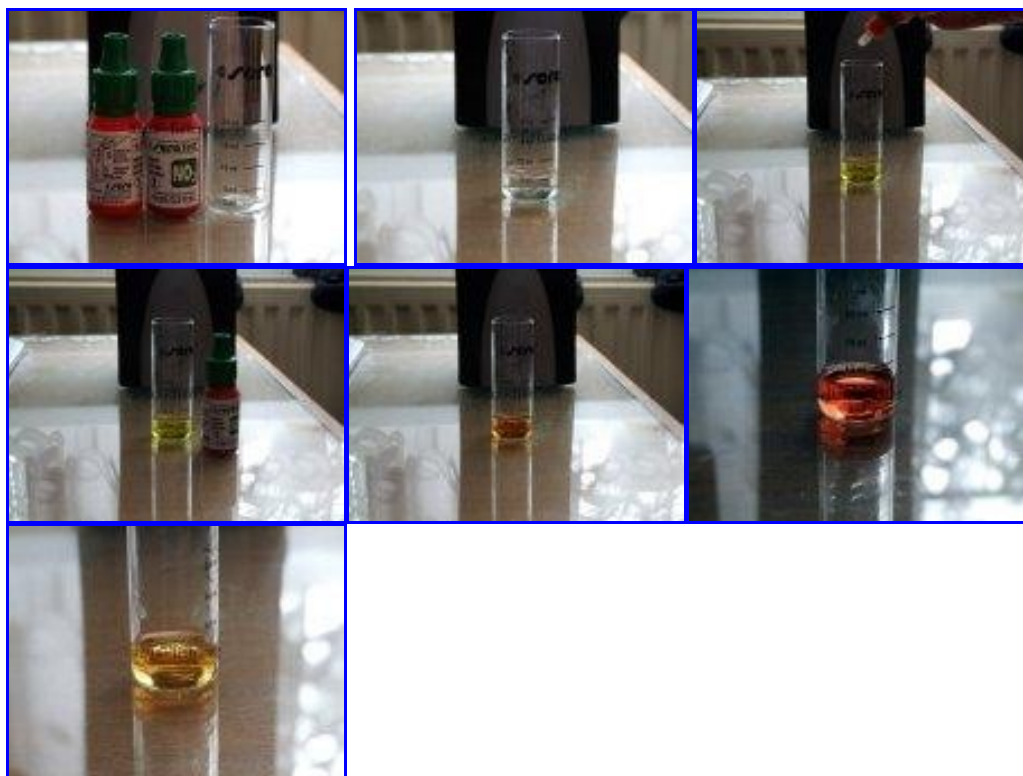
An ideal situation in an aquarium is that ammonia is not present in the water, even at the lowest concentration. When an aquarist checks ammonia levels in the tank, they are actually checking to see if ammonia is present. In the unlikely even that it is, they need to be ready to swing into immediate action to dilute the water in the tank to levels where the ammonia levels are reduced to 0.005ppm, and there are those who say that this proportion may be too high.

There are some very good ammonia test kits available on line. Here are just a few examples.

- Seachem Ammonia Alert: This simple yet effective kit contains four chemical sensitive sensors that will change color when the presence of ammonia is detected and will even provide a reading on levels.
- Nitrate Liquid Test Kit: Rapid and accurate, the Nitrate Liquid Test Kit provide a reliable test for freshwater aquariums. Contains two dropper bottles to allow accurate dispensing of test solutions, the kit comes with easy to follow instructions and color chart.

NO₂ test

After oxidation of NH₃ there is another poisonous substance in aquariums; NO₂. Man should test water each week for concentration of NO₂. Here is a step-by-step illustration of how poisonous water can change to normal after changing about 30% of water in the aquarium.



As you can see on the last picture, the water is not as poisonous as it was before (more red colour means more poisonous water).

The above articles go into more detail on the subject of cycling and test kits, there are several types of test kits to choose from it's purely a matter of personal choice which you use, ensure that the brand being used is a reliable make and if a bad result shows on a test, do another test to confirm if there is a problem or not. I prefer the liquid tests but they can also be sold as strips that will test everything in one go.

You will notice that when you buy the test kits they will contain tests for pH and GH; these are to check the acidity and the hardness of the water. The pH scale is very easy to understand 7.0 is a neutral pH, below 7 is classed as acidic water and above 7 is alkaline water. This is important as different species of fish require different water parameters. Many of the American cichlids prefer soft, acidic water but the Malawi cichlids require

very hard water with an alkaline pH. All of these aspects have to be taken into consideration when setting up your tank and deciding which fish to add to it. I normally test my mains water to see how acidic it is then I know which fish are suited to the water that I am adding to the tank on the water changes.

At aqua-fish.net there is an article covering this topic:

Aquarium Water Hardness

One of the hardest subjects that most aquarists have trouble with is understanding water chemistry and what we are actually testing for in our water parameters. We all know why it is important to check ammonia, nitrites, and nitrates in our tank, but what is pH, KH, and GH. Hopefully from this article things will become clearer.

Let's start with General Hardness (GH) sometimes referred to as Total Hardness. Depending on which type of land areas the water has passed through, varying levels of hardness are reached before it reaches its final destination i.e. if it passes over rocky areas it will have a higher mineral content, if it passes over marshy, forest areas it will normally create a soft water river or lake.

Fish like the neon tetras, and cardinal tetras are good examples of soft, acidic water lovers.

When we turn on our taps the mains water will contain many minerals that it has absorbed on its way to us, mostly magnesium & calcium, with small traces of other metals such as iron and zinc. The concentration of these minerals determines the general hardness of our water.

When we research which fish we are going to add to our tanks, the most favorable conditions given are usually represented by GH, pH, and Temp, as some fish prefer soft water like the south American cichlids, whereas the Malawi prefer really hard water, sometimes right at the top of the scale. To confuse matters worse most GH test kits will give their results in either DH (degrees of hardness) or PPM (parts per million) but don't worry as there is a simple equation to enable us to convert DH to PPM or vice versa if either scale is preferred.

Below is a rough guide to the varying levels of water

DH	PPM	Water Hardness
0-3	0-54	soft
3-6	54-108	slightly soft
6-12	108-216	slightly hard
12-18	216-324	moderately hard
18-30	324-540	hard

These figures may vary slightly depending on which reference books you use. To convert from DH to PPM is simply a matter of multiplying the DH by 17.9 to give the PPM reading. Multiplying PPM by 0.056 will give you the reading in DH.

If we wish to raise the GH in our water it is simply a matter of adding calcium based rocks (limestone) or even coral gravel as these will very slowly dissolve into it, thereby increasing the mineral count. Some keepers will use calcium based powders to give a quicker end result but I prefer the slower process.

While it is possible for most fish to adapt to different GH levels, breeders do require getting a correct level in their tanks as it can affect fertility and hatch rates of eggs.

Carbonate hardness (KH) is basically the buffering power of the water, which means how much acidity can be added to it before the pH is affected.

With an aquarium nitrates in the water will produce nitric acid, which in turn will reduce the pH if there isn't enough buffering capacity to neutralize the effect. It is generally accepted that the KH should never drop below 4.5 else this can cause major pH instability which is detrimental to the health of your fish.

This is another reason why water changes are an essential part of fish keeping, to reduce the nitrates so that less nitric acid is produced, therefore a more stable pH is reached which will prevent it from dropping over a period of time. As expected the higher the hardness of the water the better the buffering capability.

In the simplest terms I can use KH is the concentration of bicarbonate & carbonate ions in the water. Carbonate ions will try to bond with hydrogen ions in the water, the more that bond the higher the pH, (the presence of free hydrogen ions acidify the water which will in turn lower the pH (power of hydrogen)).The

result of this bonding is carbonic acid (H_2CO_3), which over a period of time will break itself down into carbon dioxide (CO_2), this will then disperse itself into the atmosphere as oxygen will force it out of the water.

If the GH/KH of the water is too high for the fish that you wish to keep there are a couple of methods to reduce the levels. On my tanks I use RO (reverse osmosis) water, this removes a lot of the carbonate ions presents as well as the mineral content thus reducing the hardness of the water. The side effect of this is that the pH will then become more acidic which was fine when I kept my discus tanks, they were quite happy to live in water with a pH of 6 – 6.5 but I am having to remineralise my RO water now for the marine set up as my pH needs to be at least 8.2. This is why RO water is very unstable as the KH can no longer buffer the pH effectively. Adding the salt to the water brings the KH/pH balance back.

If the KH is too low Sodium Bicarbonate can be used to increase the KH (I found that adding 5ml to every 40 UK gallons of water would increase it by 4DH) and this did not affect my pH by too much, as I found out by monitoring it closely with the appropriate tests.

Adding oxygen to the water will drive off more CO_2 thus increasing the buffering.

There are commercial buffers on the market that you can add to your water but check first that they will not increase your phosphate levels.

As you can see GH, KH, and pH are directly linked to each other to give the stability required for the water, if one drops it can affect the others. My best advice is that when buying fish, find ones that have requirements that match your water rather than adjusting the water to suit the fish. Adjusted water will try and readjust itself back to the original parameters over a course of time.

While the tank is cycling it allows time to monitor other things on the tank, particularly the temperature. The thermometer will be set to the correct temperature but this doesn't always mean that the water temperature will be exactly at that setting. A thermometer should be attached inside the tank to monitor this; they are relatively inexpensive to buy and are the only way of keeping an eye on the heat.

At aqua-fish.net there are articles covering this topic (the "Aquarium heaters" is placed above in previous sections):

Aquarium Thermometers Are An Essential Item

When it comes to keeping your saltwater aquarium maintained and a safe environment for all that lives within, no piece of equipment could be more essential than the aquarium thermometer. These devices vary in the materials

from which they are made, and they span a price range from cheap to expensive. The type or brand of thermometer you purchase is not as important as the fact that you do purchase one for your saltwater aquarium.

The fish and other creatures which dwell in saltwater aquariums can be very sensitive when it comes to the temperature of the water around them. Temperature changes that are too dramatic will result in death to many of your expensive tropical fish and little creatures which scuttle back and forth across the bottom of the tank floor.

Having your investments die, (and let's face it, tropical fish aren't cheap) from temperature changes is completely avoidable by simply purchasing and installing an aquarium thermometer. Since these devices come in all shapes, sizes and price ranges, there most certainly is a thermometer which is right for you.

Installation of aquarium thermometers is very simple, even if you decide to go with the high end models. Let's look at a few which are available right now.

For those of you who have spent most of your cash on tropical fish and other denizens of the deep to inhabit your aquarium, there is the Penn Plax Floating Thermometer which will set you back a miniscule \$1.60.

This frugal device is a small pen shaped floating thermometer that you can stick to the inside of the tank with the included suction cup, or you can let it float merrily along on top of the water. This aquarium thermometer reads from 20 to 100 degrees F range. Devices of this type are constructed of plastic, and can be hard to read if free floating.

If you've managed to save a bit more of your pocket change, you opt to go a little higher up the price ladder by purchasing the Marina Minerva. This thermometer will set you back a mere \$1.99. This aquarium thermometer will allow you to see the water temperature in either degrees, Fahrenheit or Celsius. It mounts easily on the exterior of the tank and reads in the range of 66-86 degrees F and 19-30 degrees C.

Digital thermometers are by far the more popular types of aquarium thermometers. For a small sum of around \$7.50 you can purchase one of many brands of basic digital thermometers. These are the type which attach to the exterior of the aquarium and are easy to use and read. These thermometers are battery powered and use a probe which is inserted into the tank, which read in the range of -10 to 140 degrees Fahrenheit and 23 to 60 degrees Celsius.

Digital aquarium thermometers can vary in price, as do the features available. Some simply tell the current water temperature, while others tell the time and temperature. Even more, there are models which have a built in memory that can

tell you the all time water temperature high and low since it was installed. Still others will have audible alarms to alert the owner that the water temperature has dropped or risen beyond a preset level.

On the high end scale of aquarium thermometers, you can find models which do all the above, and are wireless remote as well. This allows the thermometer to be installed on the tank, and have the current temperature to be displayed on a display monitor anywhere in the home. It's also possible to have a display located in multiple areas, (up to four) so you can be almost anywhere in the home and see the aquarium water temperature.

Whether you choose to go with a pen thermometer or a full duplex model is completely up to you. Either way, if you are comfortable with the performance of the model and make you've chosen, then its money well spent, no matter how much or how little it cost you. What a tragedy it would truly be to spend the time and money to have a saltwater aquarium filled with beautiful tropical fish and lose them because you failed to spend a couple of extra dollars to purchase an aquarium thermometer.

As stated earlier, it really doesn't matter what brand it is, or even how much you pay for your aquarium thermometer, the important thing is that you actually have one installed and that you read it regularly. Keeping your saltwater aquarium within optimal temperature range will help maintain the well being of the fish and other creatures that you've welcomed into your home.



The heaters should only need a slight adjustment + or – with the dial, try not to adjust too quickly, it is better to adjust the temperature slightly each day until the correct temperature is reached. With larger tanks it may be necessary to place a thermometer at each end of the tank, the furthest end of the tank from the heater can be cooler than the other end, always bear this in mind.

If your aquarium was bought as a kit, the lighting units should have been supplied with the tank. While the tank is cycling I find it better to keep the hours that these are switched on to a minimum, if they are on for too long it tends to encourage algal growth all over and is not a pretty sight. The only exception to this is when live plants have been added to the set up before the cycle has finished. The plants will require at least 10 hours of lighting per day to encourage the photosynthesis and allow the plants to grow well. Initially there will still be some algal growth but this can be curbed by turning off the lights for an hour during the day and then switching them back on in the afternoon. This disrupts the life cycle of the algae and should prevent a lot of problems with it.

While the tank is empty it will give you the chance to play around with lighting times and see which suits your tank the best.

At aqua-fish.net there are articles covering this topic:

About Aquarium Lighting

In order to answer more and more questions of Aqua-Fish.Net's visitors, this article is devoted to information about aquarium lighting. All questions have been compiled from previous statistics. If you're looking for answer that isn't answered here (or on this website), feel free to contact us.

Which lighting is suitable (best) for a freshwater aquarium?

For plants I recommend AquaGlo bulbs (I have had very good experience with these). In past I recommended 0.625 Watt per 1 litre for very fast growth. However, nowadays I am using 0.308 Watt per 1 litre. It is enough to grow plants such as Vallisneria Gigantea, Vallisneria Spiralis, Anubias Nana. Some plants (especially the floating ones) can do better under ordinary sunlight than under special aquarium lighting. Pistia Stratiotes is a nice example of such a plant.

Never buy bulbs which heat the tank too much. In Summer this can cause serious overheating.

How long should a bulb be?

If the fish tank is 100cm long, I recommend to use a 90 cm long bulb (or less, but not less than 70cm). Always try to fit the length as much as possible. If you cannot buy say a 120cm light, then combine two 50cm for instance.

What is lux?

Lux is the unit of illuminance. Freshwater aquarium plants need maximum 5 000 lux and salt water plants, sea-flowers and corals need more than 6 000 lux.

How much light do fish need and do they need light?

Fish do not need any light at all. The only thing which needs light are plants. However, light helps fish to find food and to orientate. As I mentioned above, 0.308 Watt per litre is sufficient for fishes. Even 0.15 Watt per litre would do well.

Bear in mind that fish may be scared of light especially in two cases; When the light turns on, and when the light turns off. This is the reason why I recommend to turn on and turn off the lights when the room isn't in dark.

How many hours should be a fish tank lighting turned per day?

I recommend between 10 and 12 hours. Sometimes it's OK to turn on the light for only 7-8 hours, especially during Winter. During Summer feel free to lengthen this period to 14 hours.

Do I need an aquarium light timer?

Although it is not necessary, there are unspeakable advantages of this; It simulates the day-night cycle perfectly, it saves energy, when you're on a vacation it works automatically and gives the light to the plants. I use timers on all my tanks. An electronic one costs only \$10 and it is possible to connect as many cables as needed to one timer.

Which aquarium plants have low requirements on light?

There are quite enough of them, our database contains these:

- Anubias barteri "Angustifolia"
- Anubias barteri "Caladiifolia '1705'"
- Anubias barteri "Coffeefolia"
- Anubias barteri "Nana"
- Anubias heterophylla
- Bolbitis heudelotii

Should I use night aquarium lighting, and what is the purpose?

Many aquarists use a 12V lights taken from computers for this purpose. Actually, such a moonlight is a great addition to every aquarium because fish are able to orientate better. I recommend this to every fish keeper because even my fish lost eyes, or hurt themselves very badly when they chased each other in night.

Night lights are, however, usually used in reef tanks.

What is a T5 aquarium lighting?

A T5 bulb can be characterised as: The five in T5 applies to something as innocent as the diameter of the tube. Five eighth of an inch (62mm) to be exact. Many people are unaware of this fact, yet when you think of it logically, the same scale carries its way through all of the dimensions of aquarium lighting tubes, up to and including the T8 which is exactly one inch (100mm) in diameter.

Related question:

What is a T8 or T12 aquarium lighting?

See the explanation above, please. The difference is in the diameter.

How and where can I buy cheap aquarium lighting?

As I mentioned my previous articles, “cheap” usually means getting a discount. Let me explain... I use to buy fish food, filters (from time to time) and other aquarium accessories in one aquatic shop. Thanks to this fact I know the seller very well and if I ask for a discount, I usually get it. Sometimes it helps me to save between 10% and 20% depending on the item’s price. Naturally, when I am buying food for \$3 or \$4 only, there is no reason to ask for a discount. If you want to buy some lights online, then this link should help you to find what you need.

What is a underwater aquarium light and where can I buy one?

There are more types of such lights on the market including halogen bulbs and LED lights. In general, this kind of lighting isn’t suitable for small aquariums as it needs some space. Depending on the spectrum, the water can be coloured to colours such as yellow, or purple, or more. I wouldn’t ad underwater lights to small and shallow fish tanks, and so shouldn’t anyone (the effect will be minimised).

What is the usual price of fish tank lighting?

In my experience the most lights can be bought from \$40 up to \$400. It all depends on the fact if you’re buying a whole canopy + bulbs, if there is a timer, and the number of bulbs. I am using AquaGlo Oceanic bulbs and they cost approximately \$15/bulb. So if I bought canopies for 10 bulbs along with AquaGlo bulbs, then it could cost \$225 in total (\$45 for 1 canopy that houses 2 bulbs). As time goes by, I’ll have to change bulbs only. In my opinion this isn’t too expensive.

Can I use neon light for aquariums?

Yes, you can. Just I am not sure if plants are going to appreciate the given spectrum. But again, I have seen ordinary neon lights working well with aquariums.

CHEAP AQUARIUM LIGHTING

Nowadays there are many complete aquarium packages to be bought from the high street retailers, but these all come at a price. Many fish keepers find that they can build up their systems by purchasing second hand tanks and running equipment far cheaper than just going for the complete package.

Included in the running equipment has to be a good reliable lighting system but reliability doesn't always mean that the price will strain the fish keeper's pocket. Adequate lighting has to be provided especially if running a planted tank or a reef system but shopping around can pay its dividends when trying to save pennies.

Is lighting a necessity - the answer to that is yes!!! For your aquarium to be successful then lighting will have to be added. There are several reasons for this, when feeding your fish it will help them locate the food that you have just added to the tank, never add food when the lighting has gone off, it will foul your water as it decomposes at the bottom of the tank.

If you are growing live plants in your tank they will need lighting for their growth, photosynthesis is dependant on a good lighting source. If you are running a reef tank the corals will feed from the light, they nearly all use zooanthellae for their growth, these too can only aid the corals if given enough light.

For aesthetic purposes lighting makes for easy and pleasant viewing of the tank and its inhabitants, a well lit display is pleasing to the eye for yourself and any visitors to your house.

For those of you that do not mind using second hand equipment there are several websites that allow guests to sell off any unwanted lighting units. There are generally genuine reasons for the sale, the owners could have upgraded to a more expensive unit or maybe they are just breaking down their tanks due to upgrading the tank as a whole. Some people will advertise if they intend to close down their tanks permanently due to other commitments. Keeping an eye on these websites will ensure that the correct lighting you are looking for can be purchased at a fraction of the cost of a new one, even if you intend to buy a brand new unit, using second hand ones initially will give you a bit more time to save up towards the future costs.

Often in the local papers there maybe be someone who wishes to sell off their equipment for whatever reason, always keep all of your options open for a

bargain.

As mentioned in other articles the auction sites on the internet will provide another option for getting your lighting unit. As well as second hand units being available there are plenty of sellers that are selling brand new units for very reasonable prices, always check the postage and packing charges though as some unscrupulous sellers may inflate these to recuperate some of the money. I have often seen on eBay a couple of sellers that do a very good price on fluorescent luminaries or metal halide units, they cover most sizes of tanks and even give you a choice of the lighting that will be sent with the unit, tropical or marine set up can be purchased. One tip when paying out for larger items on eBay is to always try to pay through sites like Pay pal so that if there is a problem with either the postage or the actual item purchased you have some kind of back up as Pay pal will pursue any claims for you.

One particular seller that will ship worldwide is eqj-trading that deal with all luminaries and metal halides. They are based in Germany and have been selling on eBay for quite a while now and looking through their feedback ratings seem to be selling quite a lot of units. As an example a four foot twin T5 luminarie is offered for 100 pounds (200 dollars), this works out at 50% cheaper than other well known brands like Arcadia. Having said that I have never used one of these units but I do know several people who have and they seem well pleased with them. Shipping worldwide is approx. 15 pounds (30 dollars) so the unit still works out quite a lot cheaper in total.

There are many retailers on the net that are competing with each other for business, many a deal to be had. One thing I did find out very quickly is that if you find a good retailer and become something of a regular customer, discounts will start to become quite common with your orders. On many occasions I have personally spoke to suppliers on the phone and explained exactly what I am after, the quotes given are always lower than advertised on the websites, "good customer relations", the secret to keeping in business.

Another way of saving money on your lighting is to take a step backwards in technology. All of the modern lighting units will have internal ballasts, slim line tubes like the T5's, this often means that the suppliers cannot sell their stocks of older units as the customers want to get the best and most modern that they can afford.

A few years ago I was still setting up the lighting with the bulky external ballasts and separate tube holders that needed to be fitted to the tank lids. I still have no objection to using these if I have to as the external ballast can easily be hidden from view at the rear of the tank and the tube holders can be fitted to the hood by anyone, they are so easy to do.

There are still external ballasts being made and sold but buying your lighting system this way will always work out cheaper than purchasing an all in one unit. Remember that if you are using external ballast they do get quite hot so please ensure that they do have airflow around them.

Always check out any second hand unit that you may buy to make sure that it is in full working order with no loose connections, loose wiring can lead to electrical shocks, especially when near water!

LIGHTING FOR AQUARIUM PLANTS

One of the biggest debates that have been going on for years is “what is the correct lighting for my planted tank”. Basically there is no easy answer to this question. It is a proven fact that fish are a lot happier in a planted tank, their coloration will stand out more and they will feel a lot more secure than if they were being kept in an unplanted tank so getting the plants to grow successfully is well worth while.

So lets take one step backwards from the original question and ask why plants need the lighting in the first place. Plants grow by a process called photosynthesis, this is a complicated process in itself so let me try to explain how it works.

Photosynthesis is the process where plants need to convert carbon dioxide gas and water into cell building glucose and oxygen. In nature the equation for this is:-



Looking at the equation it may still seem baffling but quite simply it means that in daylight the plants soak up the CO_2 produced by the fish respiration plus water to convert it into oxygen and glucose that will give the plant energy for growth. When nighttime falls it is reversed as the plants will then absorb oxygen and release CO_2 . This is one of the main reasons in an aquarium that keepers of planted tanks will turn off their CO_2 systems at night to prevent excess CO_2 removing oxygen from the water, this obviously would not be good for fish and plants alike.

In an aquarium there is not a chance of introducing enough sunlight to allow the photosynthesis to occur, therefore artificial sunlight has to be added, this is done by using aquarium lighting.

Strong light is normally recommended for plant growth but to make matters even more complicated there are three basic groups of plants that require different lighting levels. When you buy aquarium plants information on how much lighting is need for each type of plant should be given i.e. low lighting, medium lighting, and high lighting.

With non-planted tanks the lighting units supplied with an aquarium is perfectly adequate for the keeper as they are just looking for a lighting system that shows off the colors of their fish in the best possible way, when we start introducing plants stronger lighting units are often required. To be fair to aquarium manufacturers, a lot of them are now recognizing the demand for better lighting systems and will include them as standard in the more modern set ups.

Most keepers of planted tanks agree that the general rule for lighting is 2-3 watts per gallon.

Tubes, bulbs etc. are often rated in their wattage when you buy them but there are other ratings that should be taken into account when you decide on which lighting system is best for your tank.

Wattage

The tubes or bulbs that you buy will have various wattage ratings depending on which size you buy, this particularly applies in tubes as the greater the wattage the longer the tube will be. An 18 watt tube is normally 60 cm in length whereas a 54 watt tube will be 48 inches in length and so on.

The wattage is the amount of electrical power that the light will use. Different lighting systems can produce varying amounts of light for the same wattage, generally the more well known makes will produce better quality lighting for a slightly costlier price.

Remember though that if your lighting unit uses 4 54 watt tubes then the amount of power being used will be 4 x 54 watts which will work out to 216 watts of electrical power. Running costs on the more powerful units will be more than with the smaller units.

Lumens

Lumens is basically the amount of light that the bulb or tube will produce, this information used to be quite clearly marked on the packaging supplied but nowadays it is not so easy to find when you buy your lighting. A light that has a high lumen rating will appear very bright to the human eye, the only problem with this is that our eyes pick up light in the green spectrum more than any other color spectrum. Plants need light that is strong in the red and blue spectrum, therefore powerful lumen ratings will probably mean that the tank looks well illuminated but the plants do not benefit.

Kelvin Rating

This defines the color spectrum that the bulb or tube is strongest in. Many of the marine lighting units will have a high kelvin rating as the corals and macro algae

need a lot of blue light for growth, in freshwater set ups the plants need more light from the red band so the kelvin rating will be lower as the concentration on the spectrum shifts from the blue to the red.

Initially aquariums were supplied with incandescent bulbs that were o.k. for viewing the fish but not a lot else. As times moved on fluorescent lighting took over the market, this then started giving the aquarium owner a lot more choice as to which type of lighting they wished to use. Daylight tubes were introduced for strong, bright lighting, plant grow tubes for planted aquariums, and actinic etc. for marine tanks.

The next step was to bring out units that produced more light in the same sized units. T8 light tubes are the same length as standard tubes but produce a lot more light, this then led to the T5 tubes which produce a lot more light than the T8's.

These light units are alright for use in tanks that are of a standard depth, some of the more modern tank designs are deeper, because of this a few keepers of planted tanks are now starting to use suspended metal halide units over the tanks, these produce light that will reach a much greater depth.

The main things to remember when deciding which lighting to use are that the lighting needs to be of the right color spectrum for plant growth. A really bright light may not be beneficial to the plants if there is not enough light from the red spectrum reaching them. I would always use tubes that have a kelvin rating below 10,000K, marine tubes will be sold at 20,000K for the blue spectrum.

When deciding which unit to use, take into account the depth of the tank as well as the length.

The length of time that the lighting is supplied to the aquarium is a critical point as well. Most keepers of planted aquariums will run their lighting systems for 10-12 hours per day. This is not a fixed rule for a couple of reasons, every aquarium will have different needs, what works in one tank may be detrimental to another.

Leaving you lighting on for long periods may encourage a lot of algal growth, this is not what you want to see in a well looked after tank.

Plants also need nutrients adding to the water for growth.

Nutrients + Light = Algae

There are a couple of ways of stopping the algal growth, the obvious one being reduce the amount of unused nutrients being added to the water. Two other ways of dealing with this problem is to reduce the period that the lighting is switched on for, an hour less can have a big impact on the algal growth or lack of it.

Another old trick is to turn the lights off for an hour midway through the day; this will interrupt the cycle of the algal growth and eventually should prevent any algae appearing at all.

As mentioned earlier different plants have different lighting requirements, research the plants that you wish to add and try to get plants that have the same needs. Why invest in a powerful light unit when your plants have low lighting needs. A quick search on the internet should provide you with the information you need but as a rough guide the following should help:-

- Low lighting-Cryptocorynes, Java Fern, Java Moss
- Medium lighting-Sagittaria, Echinodorus
- High lighting-Cabomba, Salvinia, Lemma

If you do find that the lighting is too powerful for some of the plants that you have then try adding some floating plants like Salvinia to block out some of the light, another way is to plant in the shadow of other plants.

Let's now look at some of the lighting units that are available or were widely used in the past:-

Incandescent lighting:-

Incandescent lighting is the forerunner to all of the modern units now available. In the early days of fish keeping this was the only choice, in its day it was considered to be great when the tank was illuminated and the livestock was being shown off. Economically it was poor; the power needed to create the lighting was high compared to the newer units and the bulbs created a great deal of heat which in turn increased the evaporation of the water in the tank. One of my first tanks many moons ago was supplied with a 15 watt bulb (it was only an 11 gallon tank) and to my amazement the Java ferns and Amazon swords flourished under it. It was only later when I researched that I realized these were low lighting plants anyway. The color given off by these bulbs was always a bit distorted as the Kelvin rating was very low.

Halogen bulbs are more often used nowadays for the smaller set ups. This was a step in the right direction but they are still inefficient with the power usage. The light given off is brighter but still not a true coloration that is given by other types of lighting.

Fluorescent lighting:-

Fluorescent lighting was one of the big innovations of aquarium lighting, power wise it runs a lot more efficiently than incandescent lighting and a full range of different wattage and Kelvin rated tubes are available to buy. This meant that the choice of plants available to grow successfully in a planted tank increased

dramatically. Most of the original fluorescent units consisted of two tubes that were powered by separate ballast, often this ballast needed cooling by a fan due to excessive heat being produced whilst in operation.

The next step for this lighting was to slim down the tubes to give the same amount of light but for less wattage, this brought down the running costs and also meant that in some units four tubes could be included. The new tubes were known as T8's and these were closely followed by the T5's, now the choice of plants was endless. The new slimmer tubes were run by electronic ballast, in the more modern units this was built in making them a much better choice.

Metal Halide Lighting:-

With some of the deeper tanks Metal Halide lighting is the only way to get the light down to the bottom of the tank for the foreground planting. The units are usually suspended over the aquarium on wires and are very powerful indeed. These are not cheap to run; some units are using 800 watt bulbs. The advantage of these is that with them being suspended over the tank, the water will cause shadows to run through the tank landscape with a rippling effect just like sunlight does in nature.

Whatever type of lighting you decide to use, there are a couple of things to take note of.

Bulbs or tubes will lose their effectiveness over a period of time; they will need replacing after 6-9 months to keep your light unit efficient.

If you purchase a complete tank set up the unit that it comes with may not be adequate for a planted tank, check to see if you need to upgrade.

Do not overdo the lighting, if the unit is too powerful it can scorch the plants and kill them off, particularly with floating plants.

Lighting units run on electricity, if a unit is faulty replace it immediately; water and electric do not mix.

The bottom article on lighting goes into detail on why lighting is important for plants and the effect it has on their growth. Even if there are no plants in the aquarium, keepers will illuminate their tanks for display purposes, nowadays there are some wonderful lighting kits that do this very effectively.

Oxygen levels in the water are also important for the health of your future fish. If the levels drop too low then the fish will be gasping for air at the surface and will become stressed, this can lead to an early demise for your new inhabitants or it can lead to

secondary illnesses like white spot. There are two ways to introduce oxygen into the aquarium, either by surface agitation or by live plants releasing oxygen during the process of photosynthesis.

Surface agitation can be created by aiming the filter outlet towards the surface of the water to create ripples, with external filters this can be achieved by using spray bars. The ripples will draw in the oxygen and drive out the carbon dioxide present in the water. Adding an airline will have the same effect, basically the airline is attached to a small air pump and the air is then drawn through the line into the tank as is released at the other end through a suitable air stone. The air bubbles will then rise to the surface creating further agitation.

At aqua-fish.net there are articles covering this topic:

Tetra Whisper Air Pump

The Tetra Whisper Air Pump boasts to be one of the quietest and most efficient aquarium air pumps manufactured today. The sleek new design has a dome shape and an inner chamber with thick walls and a suspended motor which helps to silence the powerful motor. This air pump has rubber feet which help to keep the structure from vibrating noisily away. The purpose of the Whisper Air Pump is to aerate both marine and freshwater aquariums by powering air stones and various filters.

The Tetra Whisper Air Pump comes in models of different size to aerate aquariums from 5 gallons to 100 gallons. The Whisper 10 is the smallest size which retails for as low as \$5.49 online and the largest size is the Whisper 100 which retails for as low as \$18.29. The prices vary throughout the various websites and aquatic retail stores. In order to find the air pump to suit your aquarium size, simply refer to the model number. The Whisper 10 is meant to aerate up to 10 gallons of water while the Whisper 100 aerates up to 100 gallons of water. All of the Tetra Whisper Air Pump models in between follow the same system. The lower capacity Whisper models between 10 and 40 each have one outlet for air flow. The Whisper 60 and 100 models each contain 2 outlets for air flow allowing the pump to be hooked up to at least two different air dispensing devices at once. Multiple valve splitters are available if you want to hook up more air dispensing devices to your air pump. The larger, more powerful pumps produce more air output which makes it ideal for deeper aquariums.

Along with the Tetra Whisper Air Pump you will need airline tubing, a check valve, and a device to disperse the air and expel it into the aquarium water. Airline tubing is fairly inexpensive and you can choose between vinyl and silicone tubing. You can usually buy pre-cut sections of airline tubing but some places allow you to purchase cut lengths of your choice. The normal rules apply:

consider it paid for once it is cut. The check valve is a small device that protects your Tetra Whisper Air Pump in case of a power or pump failure. Its purpose is to prevent water from siphoning out of the aquarium and back into the pumping mechanism. In order to insure it does not malfunction, replace the check valve once every 12 months for approximately \$1.99 a piece. The air dispensing device is the main event of the air pump. It can be a plain old air stone or an air driven action ornament. Sponge filters and under gravel filters also need an air pump to run. The cost in these air dispensing devices vary with the complexity of each one and they can be found at any aquatic retail store or online.

Maintaining your Tetra Whisper Air Pump is easy because it comes with a 2 year warranty against defects in materials or workmanship. If past those two years you observe your Whisper Air Pump is not performing at its optimum level, there is a repair kit to purchase as a cheaper alternative to buying a new air pump. This repair kit comes with all the necessary parts, as well as the complete instructions to complete this task on your own. Even for those who are not very mechanically inclined, this kit is supposed to be very simple to use. The Whisper Air pump repair kit can be as cheap as \$4.50 online, depending upon which model you need it for.

If you want to prolong the life of your Tetra Whisper Air Pump there are some very simple tips to maintain it. First, be sure to install the check valve and check it periodically to see that it is in proper working condition. Secondly clean it regularly to prevent build up of dust or dirt. Be sure to clean the air dispensing device because improper air flow out of the tubing and air stones can cause the motor to work twice as hard.

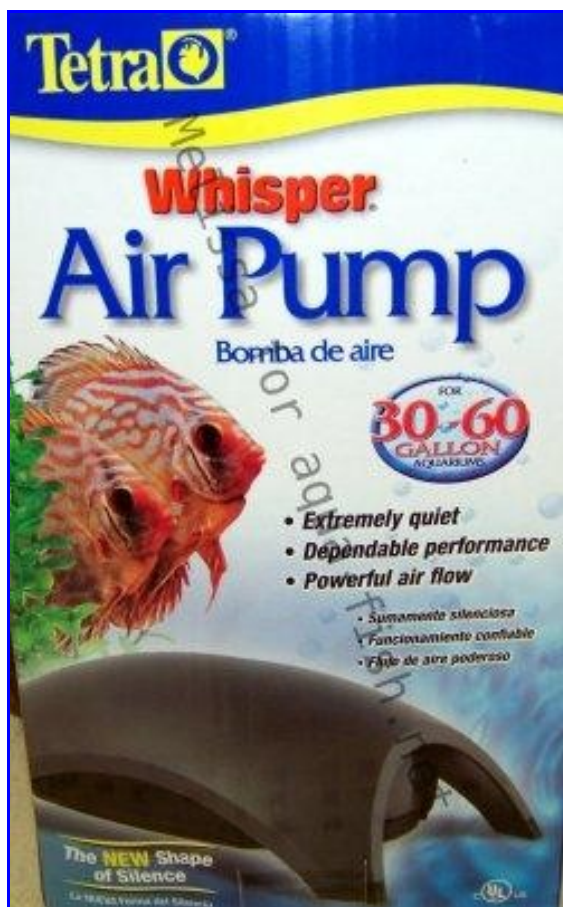
The Tetra Whisper Air Pump is only one of the options out there. The competitors all boast to be just as quiet as the Whisper and each has its own selling point. The Silent Air X-1 by Penn Plax is the equivalent machine to the Whisper 10, they both aerate up to 10 gallons of water. The Silent Air X-1 costs at least \$7.89 online, has a 5 year limited manufacturer warranty, and it uses more watts of electricity than the Whisper 10 to run. The Rena Air 50 manufactured by Rena is also meant to quietly aerate up to 10 gallons of water. This particular air pump can be found for as little as \$9.33 online making it the most expensive of the three air pumps compared here.

Each air pump seems to work just as well as the next so how will you make your decision? I went to epinions.com and looked up customer reviews for each of the three air pumps. I found reviews on the Tetra Whisper Air Pump but none for the Silent Air X-1 or the Rena Air 50. Some customers commented on the affordability of the Tetra Whisper Air Pump and that it is so small that it fits nicely in the corner. The fact that the Whisper Pump is so quiet was mentioned repeatedly. Although one customer states the sound of bubbles actually makes

plenty of noise so it is not worth it to get a quiet air pump. I just think that it is ridiculous to blame the air pump for the sound of gently stirring water.

Pictures





Aquarium airline

A key component in a properly constructed aquarium which may seem totally insignificant but actually plays a vital part is the aquarium airline.

As aquarists take fish from rivers, lakes and oceans, and place them in an aquarium tank, part of the object is to create an environment for them that will allow the fish to thrive. It is very difficult to recreate the exact environment that the fish enjoyed when not in “captivity”. It is impossible to recreate the large, even unlimited, surface areas that the fish had to live in, but at least it should be possible to recreate most of the conditions that they enjoyed within a limited area. As we all know, fish need oxygen to be introduced into the water to survive, and they also exhale carbon dioxide which needs to be expelled from the water for the sake of the fish’s health. This means that proper circulation in the tank is highly important, and this needs to be done through the process of aeration. In addition the air that is injected into the tank has to be very evenly distributed and this can only be carried out by installing an air pump.



Through installing an air pump the correct balance of oxygen and carbon dioxide will be established in the tank and the fish should enjoy a happy and health life in the aquarium tank.

However installing a pump as a stand alone item is not enough. There are a whole set of accessories that should be installed together with the pump to provide a full set of back ups to make sure that the pump does the job it was designed to do.

There are certain accessories that are relatively expensive, where an aquarist on a tight budget might be inclined to cut corners and buy a cheap version. This is what is known as “false economy” as, if the fitting breaks not only will they face a serious flooding problem, but there is a fair chance that the fish in the tank, starved of oxygen, will meet a premature ending.

The first accessory that money should not be skimped on is the tubing that leads the air to and from the pump. There are too many instances where people who are establishing an aquarium for the first time and begin to panic as the setting up cost begin to mount up. All tubing looks the same so they are inclined to buy the least expensive tubing. This type of tubing is extremely vulnerable as it will not stand up to pressure in the long term and will burst. Spend an extra few dollars on strong clear piping made usually made from silicone. These pipes are built to withstand pressure and warm water temperatures and the chances of them letting you and the fish in your care down are one in a few hundred thousand.

Some of the example of airline costs can run as follows: following companies:

Python Airline: offering a 25 feet long x 6mm diameter made from FDA approved, non-toxic, ozone safe material compounded with UV stabilizers that provide guaranteed flexibility and durability, costing \$7.30 per unit, or 30 cents per foot.

Algarde silicon tubing: offering a approximately 17 feet long x 6mm diameter made from silicon, costing \$4.80 per unit or 28 cents per foot

Algarde regular tubing: offering approximately 17 feet long x 6mm diameter, costing \$3.20 per unit or 20 cents per foot

Penn Plax regular tubing: offering approximately 25feet long x 6mm diameter, costing \$2.00 per unit or 8 cents per foot

Penn Plax silicon tubing: offering a approximately 8 feet long x 6mm diameter , costing \$1.50 per unit or 18 cents per foot.

These are just a few of the examples of tubing that can be purchased online to serve you aquarium pumping systems.

Another important item that is relatively inexpensive yet can save a lot of aggravation for the aquarist and may well prevent a disaster from occurring is a simple non return valve. If for any reason the pump switches of, then this little valve will prevent the water flowing backwards from the aquarium and onto its surrounding areas. A situation that is extremely especially for the fish as well as the surrounding areas. A simple anti-backflush device will prevent this from happening.

Water flowing through the air lines need to be controlled against a ratio of water temperature to oxygen levels. These are calculated on ascending scale where the water temperature is 15°C then the highest level of oxygen in the water should be no more than 10.1 milligrams to the liter. The highest scale is 28 °C should contain no more than 7.8 milligrams of oxygen to the liter with an average of 22 °C containing 8.9 milligrams of oxygen to the liter. These may seem like minor points, but they are important to the efficient management and function of the cooling system in the tank, and why only the best aquarium airlines should be installed.

Even while the tank is cycling there are plenty of other items that can be collected ready for when the tank is in full swing. Many of the smaller accessories can be purchased like cleaning gear and the nets etc. To clean a tank properly there are many items that will be useful like scrapers, algae magnets, even a dishcloth and an old toothbrush. I must have about 20 items in my cleaning kit and keep them all separate so that they get used for nothing else.

At aqua-fish.net there is an article covering this topic:

Fish Tank Cleaning

One aspect of the fish keeping hobby that is often neglected has to be the cleaning of the aquarium. I set myself a schedule of routine cleaning that needs doing regularly and stick to it, by doing this, the health of the fish will not be compromised as detritus and algae do not clog up filters etc., because of bad house keeping. There are many aids to help us out with our tank chores, long gone are the days when we had to roll up our sleeves and get our arms wet to clean the

glass and substrate. I keep a box purely for my cleaning utensils, buying these handy tools can make cleaning the tank a pleasure rather than a burden.

This is a list of my cleaning gear:-

- Long handled algae scraper with a pad on the reverse
- Long handled blade scraper (do not use with acrylic tanks)
- Siphoning tube
- A bucket which is only used for cleaning purposes
- White vinegar
- Clean dishcloth
- Paper toweling
- Filter brushes
- Filter pipe brushes
- Gravel vacuum
- Algae magnet
- Sterilizing tablets
- An old toothbrush

This may seem quite a long list but when you start doing the aquarium cleaning you will eventually be using them all.

My first cleaning of the aquarium takes place when it has just been purchased, a lot of keepers tend to overlook this but it is very important. Brand new tanks will be packaged to prevent breakages or scratches; the packaging tends to hold dust, especially if the tank has been stored for a length of time. Once the packaging has been removed the tank should be filled outdoors to check for any leaks, while you are doing this you have the chance to remove any dust particles that could contaminate your water when it is set up for use. This is where I use the sterilizing tablets to get the glass nice and clean as well. You must rinse out the tank after this initial clean so that all traces of your sterilizing solution has been removed. I normally rinse three times just to make sure. This initial cleaning stage is very important if you are setting up a second hand tank. You cannot guarantee what medications have been added by the previous keeper, sterilizing the tank will help eradicate anything that has been used in the past.

Once you are satisfied that the tank is up to standard you will be ready to add your gravel and whatever ornaments you wish to add. Cleaning these before they go in the tank will save you a lot of tank maintenance in the future. Rinse the gravel

several times as it is always sold with a lot of powdery dust in it. If this is added to the tank it will soon clog the sponges in your filters. Rinse any ornaments to clean off any residual dust but do not use any soaps or detergents, these will add toxins to your tank water if not removed thoroughly.

The tank is now set up and running, this is where your cleaning schedule will kick in. at first you will be cleaning off a lot of algae but as the tank settles down it will become easier. I always try to do my tank clean just before a water change. The reason for this is that once you start cleaning the tank glass and gravel it will leave suspended particles in the water, rather than letting these particles go through your filtration system, most of them can be removed by performing the water change. Every other day I clean the tank glass. I do this on a regular basis as it prevents algae forming a crust on the glass which makes it very difficult to remove. For the front glass I use the algae magnet. For those of you that have never used one, they are sold as two separate parts, both with a magnet built in. One half will have a smooth fabric on its face, this is to go on the outside of the tank, and the other half has a coarser surface for the inside of the tank. The magnets will hold the two parts together when they are placed either side of the glass. Cleaning is performed by simply gliding the outer half over the glass; this will move the inner part too. If there is algae on the glass that refuses to budge the scraper is brought into play. It will soon shift any residues but if you are using a scraper with a metal blade, never attempt to use it on an acrylic tank. These tanks scratch very easily and you will ruin the front face.

On a weekly basis use the scraper to clean the back glass, often it is just a matter of reversing the scraper so that the pad side is showing. For the fussy keepers like me out comes the toothbrush for those awkward areas that the scraper can't reach. Another part of my weekly cleaning regime is to vacuum the gravel. This can be done with just a siphon tube but you run the risk of siphoning out your gravel at the same time. I always use a purpose made gravel cleaner, this will remove any uneaten food or rotting vegetation before it starts to spoil the tank water. You will be amazed at how much detritus is siphoned out of the tank when you do it.

Depending on the size of your tank, the filters will need the sponges rinsing in old tank water, on a regular basis. With the smaller internal filters, I find it best to do this on a weekly basis. The larger canister filters should only need cleaning out every 2-3 months. This is a lot more involved as not only do the sponges need rinsing, the other media in the canister will also need a quick rinse. While the canister is open I also clean the pump impellor with a filter brush to keep the filter running as efficiently as possible.

Never rinse out filter sponges in tap water-it will kill off the beneficial bacteria!!!

One part of the tank that is often overlooked is the lighting. The tubes will collect

water splash stains on them and some household dust, over time this will reduce their brightness if left. Cleaning these, once a week with a damp cloth will prevent any build up.

Over a period of time you may find that your tank ornaments will have built up a coating of algae or debris. To clean these, remove them from the tank and rinse off the detritus then replace them back in the tank. If the ornaments are too difficult to remove I use my toothbrush once again. This is such a versatile little tool. To reach the bottom of the tank I attached the head of the toothbrush to a long plastic rod by means of elastic bands and every part of the tank is easily accessible.

Once you are satisfied that everything inside the tank is nice and clean we can look at the outside of the glass. When we perform water changes, invariably there will be drips of water that will run down the front of the tank. After a while they can leave a residue as they dry out, removing this is also very easy. Never use household cleaning agents for this, and never use polish to clean your tank cabinets. If either of these are accidentally sprayed onto the water surface it can contaminate the whole tank.

For cleaning the front glass I use a damp dishcloth and white vinegar. The vinegar will break down any residue in no time, to dry and buff up the glass use paper toweling. As with the lighting I use a damp cloth to wipe down any dust or debris off the cabinet, this is also dried with the paper toweling.

The tank is now clean, the fish are happy, the job is finished. Not quite, always clean the utensils that have been used straight away, if you don't clean them, the next time that you use them they will be contaminated from the last cleaning session.

As a footnote, you will have seen on my list that I keep a bucket purely for cleaning purposes. The reason for this is that I use a separate bucket for mixing my new tank water, this helps prevent another risk of contamination.

Nets are definitely required for future use, they come in a range of sizes so if you know which fish you are planning to add to the tank you should have a good idea of which size nets you will require. One good tip is never use the same net on different tanks; this can encourage the spread of disease from one tank to the other, buy nets for each tank that you own and when they are not in use leave them to soak in a mild detergent but rinse them thoroughly before using them again.

Lastly, by now you will be ready to stock up with a supply of suitable foods for your fish, these come in a variety of forms, flakes, pellets, wafers, live and frozen. By researching

the fish you are going to keep you will have a good idea of which foods will be right for your fish.

More information:

FROZEN FISH FOODS

An important part of satisfying your fish's diet is variety. Just to feed them flake every meal, not only deprives them of some important vitamins, but can also bore the fish into not eating. Nowadays there are so many options on the market to buy that it makes sense to keep in a stock of flake, frozen, and in some cases live foods.

The advantages of feeding frozen are not just the extra vitamins, but it can also make your fish a lot more colorful and energetic, swimming happily around the tank. A lot of digestive problems can occur by just feeding flake or pellet foods, which can then lead onto other problems as the fish will become constipated.

The price of frozen food is slightly more than the others but the benefits of using it can well out way the extra costs.

The foods available are normally supplied in cubes, encased in a blister pack to keep them fresh, or they are sometimes available in a solid block. Always remember to only thaw out the amount required, even if using the cubes, they can be chopped into smaller pieces. Never put them in the tank frozen as fish have very delicate stomachs, they certainly wouldn't enjoy swallowing any ice that is still in the block.

When thawing it out, leave it for 30 minutes, no longer as it can go off very quickly, never try thawing it using hot water, this will remove most of the vitamins plus reduce the freshness. I found the easiest way was to place my frozen block in a cup full of tank water for 10 minutes, and then add it to the tank.

Never under any circumstances re-freeze the food once it has thawed out!!!

Another good tip is to soak the cube in a vitamin supplement so that the fish will take these in with their food without even knowing it. Spread the food over the top of the water so that all of the fish get the chance to feed, frozen food will sink straight away and therefore if it is put into the tank as a clump, and the slower feeders will miss out.

Watch your fingers when doing this, as its best to slowly rub the food between your fingers on the water surface, many fish are finger nippers, and believe me, you will feel them if they get you!

Feed the frozen food 2 or 3 times per week so that the diet is varied along with the flake or pellet food.

Now lets look at which feeds are available in a frozen format

- **Brine shrimp**
Normally sold in cubes, this is ideal for conditioning fish when they are getting ready to breed, although the adult brine shrimp are not high in nutritional value on their own, they can often be bought frozen with other food such as garlic or plankton.
- **Mysis**
This shrimp is fed in saltwater setups and is very high in protein, making it ideal for not only fish, but for a lot of the corals kept in a reef tank.
- **Tubifex worms**
These worms are a favorite with many fish. The freezing process will greatly reduce them passing on any infection to your livestock, which is sometimes the case when fed to the fish fresh.
- **Daphnia**
These are actually better known as water fleas and make a great all rounder for many varieties of fish.
- **Cockles and Mussels**
These are very high in protein, when bought in a frozen state; they will have already been chopped down to the perfect size for feeding your fish.
- **Bloodworm**
These have to be the most well known frozen food available, accepted by all fish but care must be taken not to include too many in the diet, they should be given as a treat only.

Also available to buy are mixed diet frozen foods, a couple of examples are foods designed for Discus and Malawi's.

These contain a full balanced diet for each specific breed of fish but should still only be used as part of the main feeding regime, along with flake or pellets.

I am a great fan of buying frozen prawns, the small variety, chopping them up to make them a reasonable size for the fish to eat, they love them.

A cost cutting exercise can be achieved by freezing your own foods. Mosquito larvae are a seasonable food, mainly late summer, so why not scoop up extra; fill an ice cube tray with de-chlorinated water, then add the larvae and freeze them.

This will provide food all year round.

I used to prepare my own mixture of flake, brine shrimp and garlic, mixed together. Due to the amount I made in one go, I found it easier to roll it onto sheets which were scored and then frozen.

Anytime I needed a piece, because I had scored the sheet, it was easy to break off the amount required for thawing out. Preparing food this way ensures that you can create the perfect mix for your fish.

There are frozen food suppliers on the internet as well as in your local fish store, so shop around not only for prices, but also for the large variety available nowadays.

LIVE FISH FOODS

Live fish foods make a great supplement to the diet of your fish and some of these can be cultivated quite easily therefore providing a free food as well. Aquarists must always remember though, these foods should not be fed as the only items on the diet as they can lead to digestive problems in the fish, a main diet of flake, pellets or similar should also be fed as the vegetable content will keep the digestive tracts clear.

Because of the above problems, I will only feed live foods two or three times a week, as a treat for the fish. Live foods can also be disease carriers so always purchase your starter colonies from a reliable supplier.

The main live foods come from various types of worms, so I will list these first and try to give tips on how to culture them.

Earthworms:-

I have an abundance of these in my back garden just waiting to be dug up for fish food, but this is not the case for everyone, so a simple wormer can be made from any kind of box or even an old fish tank. Just fill it with soil or compost medium, add some worms and they will form their own colony, ready to harvest in a month. The soil or compost must be kept moist at all times and will need renewing every three months. If using a wooden box, make sure there are ventilation holes to allow oxygen into the set up. Feeding the colony couldn't be simpler, just sprinkle over some chopped up kitchen food waste for them to eat. These worms are suitable for larger fish and if chopped, smaller fish can be fed on them. Remember to clean them thoroughly before use!

Grindal Worms:-

These worms are a very small variety, usually they will only grow to about half an inch, and this makes them ideal food for the smaller fish. When added to the tank it is quite common for them to hide in the substrate so they are ideal for bottom feeders.

A starter culture can be purchased from most fishing tackle stores or even online. Using a plastic container, add some compost or soil, with these worms it must not have a high peat content as they prefer more of an alkaline medium, make some ventilation holes in the lid, then add the worms.

The medium should be kept slightly damp at all times, so a light spraying of water every couple of days should suffice. Keep the container in a shady position, else the worms will bury themselves, and feed them on rotting vegetation. The trick to harvesting these is to remove some of the medium from the container, place it in another one & submerge with water. The worms should come to the top of the water where they can be caught with a net.

White Worms:-

These are very similar to grindal worms, but they will grow larger, anything up to one inch. They are harvested in a similar manner to the grindal worms, but I found that I had a higher success rate by feeding them with bread that had been soaked in milk. There is no need, feeding them this way, to add moisture to the medium. With these I found it best to keep creating new cultures from the mother culture in case things went wrong, simply just remove some of the medium from the container & restart another one.

Harvesting is really easy with these, they simply crawl to the top of the container, where they can be scraped off & fed to the fish.

Vinegar Eels:-

Vinegar eels are very small worms, so they make great food for fish fry. They can be compared to the size of juvenile brine shrimp.

Basically all that is needed to grow these is a normal glass jar, to this add a mix of water and cider vinegar (one part water to three parts cider vinegar). To this add a small amount of chopped apple to provide some bacterial growth for the eels to feed upon. Add your starter culture two or three days later to the jar, then just leave the jar somewhere – covered over but allow air in, while your colony feeds and multiplies.

To harvest these worms, a very fine sieve is required even as fine as filter paper, pour your liquid over it, retaining whatever goes through to put back into the jar. Rinse of the vinegar mixture, and then feed to the fish.

Mosquito Larva:-

These have to be the easiest food to culture out of all of them. Simply place a water container outside, add some edible kitchen waste into it, make sure it is placed in a mesh bag or something similar, fill the container with water and let nature take its course. As the food waste breaks down it will attract the mosquitoes, they will then deposit their eggs, which in turn will hatch out into larva.

Obviously this will not happen in the colder months, so try it out late summer, early autumn, as any spare larva can be frozen in ice cubes for future use.

Strain the water to harvest the larva, but as the container will have its own unique smell and look quite distasteful by the time you are collecting these, please rinse them to prevent any pollutants being passed into your tank.

As well as the above worms there are also crustaceans and insects that can be used, in fact in the summer I often add any ants I catch, into the tank as food. Brine shrimp has to be the most common live food given, here is a link on how to hatch and harvest these creatures: [Raising Brine Shrimp](#).

Remember with brine shrimp that the more they develop, their nutritional value will decrease.

Copepods are an arthropod that many marine keepers will keep in a refugium, so that a colony will grow, safe from predators, and then these can be harvested for a food source to be added to the main tank.

Fish food

Feeding freshwater tropical fish is obviously very important part of fishkeeping in general. Depending on species which you keep, it's necessary to find the most suitable food due to following reasons:

- 1) Prevent diseases in the tank,
- 2) Help your fish to be active,
- 3) Make your fish well-coloured,
- 4) Stimulate breeding,
- 5) Proper fry growth.

Division into groups

Generally, fish food can be divided into 2 basic groups; Live-food and „Lifeless“ food. However, this doesn't mean your fish require one kind of food only. Bear in mind that every species eat differently which is the result of various factors including, but not limiting to it's locality, momentary season, it's place in the food chain, size, feeding habits, etc.

Even though live/lifeless food division might look sufficient for beginners, let's use another division which helps us to determine what to feed your fish. This division is based on habits which determine if fish accepts vegetables, meal based food, or both:

1) Omnivore – Such fish eat animal and plant matter. Despite very common opinion that it's not necessary to feed omnivores both types of food, they require vegetables and live food as well as water, light, and basically everything what's necessary for living. Nearly all home-kept fish are omnivores even though they're considered to be herbivores.

2) Herbivore – Fish which eat plant based food only. Catfish are considered to be part of this group, however they like meat based food too.

3) Carnivore – They're meat-eating fish. This group includes many African cichlids for instance. Carnivore fish are usually aggressive against other species and shouldn't be kept with weaker species.

In order to understand what your fish need, you must select food which is acceptable. Acceptable food should fit all of below-mentioned criteria:

1) Fish must be able to eat food. This means the food size must be less than mouth size and what's more, it must be less than the size of digestion tract. Many fish have larger mouth than their digestion tract, so that if you feed them large pieces of food you can see they spit it out. Basically, they snap a small piece which they can eat. The rest will fall down to the bottom levels of your aquarium. Because

for this reason it's good to keep bottom-dwellers such as catfish, cories and pleco species.

2) Nutriment and vitamins-rich food is necessary for healthy tank.

Now we can divide food into more specific groups which describe each freshwater species in general.

1: African cichlids. Diet: Cichlid flakes, pellets, beef heart.

2: Angelfish. Recommended food: Granules, bloodworms, flakes, brine shrimp, frozen food.

3: Barbs. You should feed them flakes and frozen food.

4: Betta species. Blood worms and granules.

5: Catfish. Catfish as bottom-dwellers like vegetable/meat tablets, but tend to flakes if they can reach top levels. They also love frozen beef heart and tubifex.

6: Danios. Recommended diet: Mostly flakes.

7: Discus. Freeze-dried bloodworms, brine shrimp, granules.

8: Goldfish. Pellets, flakes, granules.

9: Gourami fish. They prefer granules and tablets, but eat beef heart as well.

10: Loaches. Wafers, flakes, frozen food.

11: Plecos. Tablets, flakes (if they can reach top levels), frozen food, tubifex.

12: Rainbowfish. Flakes.

13: Rasboras. Mostly flakes and granules.

14: Sharks. Frozen food, beef heart.

15: Tetras. Nearly all tetra species are small fish which prefer granules, tablets and flakes.

Of course, you can feed your fish other food than mentioned in this general division. Especially if you keep carnivores, you can feed them feeder goldfish (small goldfish born to become a dinner of other fish only), small guppies, mollies, platies, etc. Avoid overfeeding at all cost. There are species which can

accept unlimited amount of food, but less is sometimes more. If you feed fish too much for a longer period, they will become fat, which results in diseases, swimming problems and lower water quality (thanks to food which decompose as uneaten). Especially uneaten food threatens all living organisms in your tank. As time goes by, uneaten food turns to fungus or gets sucked into filter.



Tips

Advantage of beef heart is that it helps fish to be coloured nicely. Disadvantage is that fish will easily „forget“ about other food, what's potentially dangerous. Beef heart results in fat bellies too. Unlike beef heart, vegetables are full of vitamins and should be put into tanks. However, there's a big problem lying here; If fish aren't fed vegetables from juvenile age, they will probably ignore it.

Fish feeding should reflect their appetite. This means nearly all species require food twice a day. Feeding on a random basis isn't recommended, however it can be seen in nature (there's no 'feeding time') in the wild.

Naturally, if you keep fish for breeding purposes, it's necessary to follow these feeding rules:

- 1) Increase amount of live food during the breeding period. Live food stimulates breeding. If you keep herbivores, don't use meat based food of course.
- 2) Feed fish more than usually.
- 3) The fry usually accepts Artemia Salina. If you use other food, they will probably have troubles. Moreover, many fish will probably die. Juvenile specimens should be fed 5 times a day.

As the last point of this article, bear in mind that quality usually costs more. On the other hand, it's better to feed fish quality food than buying new fishes each two weeks. Don't buy low quality food, otherwise your fish will be unhappy, coloured poorly, etc. The last thing you want your aquarium to look like is that it's dead.

Pictures



5. Suitable fish for Beginners

The term “suitable fish for a beginner” can be a bit misleading. I would rather describe suitable fish as fish that can tolerate some change in water parameters while our “novice” fish keeper is settling into their new hobby. The main idea of this hobby is to set up the tank, relax in front of it and enjoy our handy work. The last thing we want is to get stressed as fish start to suffer and everything just seems to go wrong. Initially keeping fish that can override our mistakes that we all make when we first start out will help us to learn as we go along without suffering fish losses. There are thousands of species of fish to choose from but following certain guidelines will help us to make the right choice for our first tank set up. Always research a fish species before you buy it, once it belongs to you it is a lot harder to try to take it back to the stores.

One of the first things I look for is how compatible the fish is with other tank mates, if we are setting up a community tank with several different species they all need to get along with each other. There will always be minor disputes inside the tank as fish try to claim their territories etc. but these are usually minor and finish with no lasting injuries. There are certain species of fish that can only be kept with their own species, never try to mix these with other fish; it will mean deaths in the tank.

As mentioned above, hardy fish will tolerate wider water parameters and on new tank set ups these will vary a great deal from day to day. The pH of the tank will slowly decrease as the tank cycles and matures; there may be the odd mini cycle where the ammonia and nitrites may suddenly spike and then return to zero again. All of these changes will have an effect on sensitive fish more than hardy ones so always check with your supplier just how the fish will react in the tank.

Another tip is to select fish that are not highly priced. While you are still learning the hobby there is no point spending loads of money on expensive fish and the worst happens. This may sound a bit heartless but a lot of future keepers have suddenly decided fish keeping is not for them purely due to the fact that it cost them so much money to start off and then the tank didn't work out as it should so the expensive fish all died. There is plenty of time to move onto the more elaborate species when you have more experience.

It is often best to settle for the smaller species to start with as many new keepers will be starting out with the smaller tanks. There is no point getting a fish that will outgrow your tank quickly so that you then have the expense of buying a larger tank before you have had the chance to enjoy your first tank.

Some of the more rarer and expensive species are also very finicky when it comes to providing them with food, it is far better to stick with easier fish that will accept any food that is offered to them. Go for species that will eat flake or pellet foods that are easy to find and relatively inexpensive compared to the specialist diet foods. There is nothing more disheartening than giving your fish food just to see them refuse it and slowly start to starve.

There is a golden rule that needs to be observed when buying your fish; to stock the tank correctly there should be no more than one inch of fish per gallon of tank water. This is why it is also better to go for the smaller species, doing this will allow you to have a wider range of fish especially if you are setting up one of the smaller tanks.

Here is a list of the most common species that will also make suitable fish for you once the tank is cycled and ready for them. Do not add all of your fish in one go but buy 2-3 fish per week and build up your stock slowly.

Catfish and Loaches

These are great bottom feeders who will sift over the substrate looking for food, they do prefer some hiding places in the tank and may disappear every time you approach when you first buy them but they will soon get used to your movement and start making appearances in the day time.

Here are some examples of these:-

Clown loach - *Chromobotia macracanthus*

Information about care

Clown loach is the common name of *Botia macracanthus* (you can also find *Botia macracantha*), and is one of the most common fish in aquarium. They are native from Borneo, Sumatra and Indonesia, the most of them are still captured in the origin places, transported and sold around the world; some others are bred in large ponds where their life is almost the same they have in nature.

In nature, Clown loach can reach up to 30cm of length, while in aquarium it grows less and reaches about 10 – 12 cm; 20 cm in large tanks. It has long slim yellow body with three black stripes, the first on the eye and the last at the end of the dorsal fin, the tail and barbels near the mouth are reddish, but the colour concentration is different for each fish and change with food varieties and water qualities. *Botia* can get adapted to every freshwater aquarium, but prefers a temperature near 82,5°F (28°C), a neutral pH and a soft or medium water

hardness.

In nature, they live in big groups, so when you decide to house them, do not take only one fish, but take a trio or some more, in this case remember they can grow quite big so be careful not to overpopulate your aquarium.

Botia are known to eat snails and often are taken for this reason, anyway they do not eat a lot of them and seems to prefer pellet fish food; if you need to kill all the snails in your aquarium a badis badis fish works better, and there are also various techniques that do not employ fish at all.



YoYo loach - Botia almorhae

Information about care

YoYo loach is the common name of Botia almorhae (once called botia lohachata) that belongs to the botinae species, like clown loach. The fish was thought to have originated in Pakistan, though they are also found in India and Bangladesh, where almost all the botia we have in our aquariums are fished or live in big ponds for captive breeding. YoYo loaches are mostly wild caught specimens as they do not breed easily in captivity.

It has a rather interesting pattern and various strains of this form exist; Usually reaches 10 cm in length and it's light grey body is characterized by dark spots that cover the entire fish from head to fins.

Like other botia, the barbels at the sides of its mouth helps it to dig tunnels on the aquarium ground. Due its attitude is better to set up the tank with soft rounded gravel or sand, plants must be strong and can eventually be protected by stones or pots. Botia almorhae is a peaceful fish and can live in almost every aquarium, anyway it can be sometimes really territorial with other fish living on the ground, so house it only in big tanks not too much populated.

Yoyo loach is more active during night, while during day stays repaired under plants or decorations, being a shy fish it is better not to have a strong lighting, or use some floating plants to shade the aquarium.

Especially during night it can happen that they come under the surface to eat; anyway living on the ground they mostly eat the food fallen from other fish above, and other not floating product thought for them; the base of their diet can be constituted by common fish pellets and spirulina pellets.

They require good quality water with efficient filtration. They are omnivorous and feed at the bottom of the tank thereby keeping the tank clean of uneaten food. They do best in medium to large planted aquariums, preferably with a sandy substrate as the species tends to grovel in the sand for these leftovers. The yoyo loach does best in a small group.



Adolfo's cory - Corydoras adolfoi

Information about care

Food and feeding

Will accept all foods offered; add sinking pellets to ensure food reaches the bottom of the tank. An occasional treat of blood worm will be relished.

Origin

These are found in Brazil on the middle Amazon regions, Rio Negro and Rio Uaupes.

Sexing

When viewed from above, the females will have a fuller outline and will be slightly larger.

Breeding

Plenty of water changes to provide a good clean climate should induce spawning. There will be 20-30 eggs laid in each batch and the female will carry them by creating a pouch with her pelvic fins to deposit them on the underside of plant leaves or even the tank glass. The eggs will hatch a few days later and once the fry are free swimming they can be fed on newly hatched brine shrimp.

Lifespan

Expected life span is 5 years.

Short description

These fish do like swimming spaces at the front of the tank and are best kept in groups of 5 or more.



Bronze cory - Corydoras aeneus

Information about care

Food

Bronze Corys are omnivores that will accept a variety of foods offered to them. They will accept flakes, pellets, live and frozen foods.

Sexing

When viewed from the top mature males will appear smaller and slimmer than females.

Breeding

Bronze Corys should be kept in groups of 6 or more so that pairs can be formed. Condition the pairs with foods high in protein in order to induce spawning. The female will clean a spot where she will plant her fertilized eggs. The eggs will hatch in approximately 4 to 5 days and the fry will become free swimming after 3 more days. Feed them powdered fry foods until they are large enough to accept newly hatched brine shrimp.

Lifespan

The Bronze Cory can live for up to 5 years.

Origin

This fish is native to most of South America including some of the islands off the coast.

Short Description

The Bronze Cory has armor like scales that overlap to provide optimal protection for their skin. Another form of defense is their locking spine which makes them hard to swallow by predators. This spine can also cause them to get stuck in a net while being captured so special care must be taken when removing them from the tank.



Agassizii's cory - Corydoras agassizii

Information about care

Food and feeding

Quality flake and pellets should be the staple diet of these fish. They will also accept shrimp pellets and a treat of blood worm or brine shrimp will be relished.

Origin

South America; they are to be found on the Amazon River basins in Brazil and Peru.

Sexing

Females tend to be larger than the males with a much more rounded body shape.

Breeding

Plenty of cooler water changes should induce the spawning. The male will dance around the female and she will create a basket for the eggs with her ventral fins. The eggs will be deposited around the tank, on plants or even the tank glass. The eggs should hatch after 5-6 days and the fry can be fed on Infusoria.

Lifespan

This Corydoras can live for up to 10 years, in the aquarium it is more likely to be 3-5 years.

Short description

As with all Corydoras, these fish need to be kept in small groups of at least 5 fish.

They prefer a planted tank with plenty of hiding places. Only use a fine sand or smooth gravel for the substrate to prevent barbel damage.



These fish tend to be more active in the evenings, it is best to feed them then as they may miss out on a lot of the food in the daytime.

Livebearers

There are many species of livebearers to choose from but the three most common found have to be Guppies, Platys and Mollies. They are very hardy but prefer alkaline water (pH above 7.0). These fish will eat any food that you give them but they can be a bit destructive with plants in the tank. Often they will breed in the tank without any help from the keeper so by doing this they also create added interest.

Guppy - *Poecilia reticulata*

Information about care

Guppy is very peaceful and nice fish, which doesn't require large tanks or very specific water quality. They do best in the community aquariums, but an aquarium with Guppies only could be very good decision. Bear in mind that slow water and enough plants are required.

Feeding

Guppies will accept almost all fish food. Even though they look hungry all the

time, you should feed them once or twice a day.

Sexing

Males are nicely coloured, have large fins. Females are larger than males.

Breeding

You need tank and pair of guppies only. However, floating plants are required if you want newborns to survive.

Lifespan

Guppies usually live 2 years. In my experience, some specimens can live 3 or more years. On the other hand, such lifespan is rare; about 5% of Guppies live so long.



Endler's guppy - Poecilia wingei

Information about care

Food and feeding

Provide these fish with an algae based flake food and small pellets. For treats supply them with blood worms, brine shrimp and tubifex

Origin

South America, they are to be found in the Paria Peninsula, Venezuela.

Sexing

The males will display a high colouration and may have slightly extended tail

fins. Females, when mature will display a gravid spot near their anal fin.

Breeding

These fish breed prolifically just like their guppy cousins. The females will give birth to live fry every 23 days, these can be fed on newly hatched brine shrimp or crushed flake straight away. The juveniles will not develop their colouration until they are at least 3-4 weeks old.

Lifespan

The expected life span for this fish is 3-5 years.

Short description

Always use a tight fitting lid with Endlers as they are very good jumpers. It is best to keep them in a species tank because of their size. It is best to keep 2-3 females with each male.



Sailfin molly - *Poecilia latipinna*

Information about care

Food and feeding

Although these fish are classed as herbivores, they will accept a treat of blood worms. Their staple diet should consist of vegetable matter, quality flake or pellets. The addition of weekly algae wafers to their diet will help condition the fish.

Origin

South and Central America; they are to be found in fresh, brackish and even

saline coastal waters of Texas right down to Mexico.

Sexing

Males will have a modified anal fin called a gonopodium. This resembles a tube at the back of the fish. Females will have no adaptation to their anal fin.

Breeding

The males will fertilize the eggs of the female internally. The females can store the sperm for months but once the eggs are fertilized, gestation is normally 3-4 weeks. The fry will be born live so include some plant life in the tank for them to hide away from predators. The fry will accept crushed flake or brine shrimp.

Lifespan

The expected life span for females is 3 years. The males may only live for 1 year.

Short description

These fish can live in water that has low oxygen content as in their natural habitat they will survive in roadside ditches and shallow pools.

This fish has many variants and one of them is called Dalmatian molly.



Short finned molly - Poecilia sphenops

Information about care

Feeding

Vegetables, granules, sometimes worms.

Sexing

Females are larger.

Breeding

Quite easy. You just need a male along female. These fish breed easy such as Guppies.

Lifespan

3 years.

Additional information

Also known as Black molly, Black mollie, Molly.



Platy fish - Xiphophorus maculatus

Information about care

Feeding

Brine shrimp, vegetables, granules, flakes. Use live food from time to time.

Sexing

Males are smaller than females.

Breeding

Very easy. Your tank will be probably overpopulated if there is no other fish which could eat the fry.

Lifespan

About 3 years, 6 months. Might vary.



Variegated platy - Xiphophorus variatus

Information about care

Food and feeding

These fish will accept all foods offered but make sure that there is some vegetable matter included in the diet. Use a quality flake for the staple diet and give them treats of blood worms or brine shrimp twice a week.

Origin

Central America; this fish inhabits the waters of Southern Mexico.

Sexing

Males tend to be slightly smaller than the females. They also possess a modified anal fin for breeding purposes. This is known as the gonopodium.

Breeding

These are a very easy fish to breed. The male will inject the sperm into the female via the gonopodium to fertilise the eggs. The female can store the sperm for up to 6 months so there are cases of the females giving birth when there are no males in the tank. The gestation period is 4-7 weeks and the fry will be born capable of accepting crushed flake or newly hatched brine shrimp.

Lifespan

The expected life span for this fish is 3-5 years.

Short description

An excellent fish to add to a community tank but they may nibble on some of the plants. Always keep these fish in alkaline water and provide hiding places for them.

Also known as Variable platyfish.

Tetras

There are many species of Tetras available to buy and they make great community fish. They will swim in shoals and occupy the middle of the tank. Any food will be accepted and they are very peaceful. Some species are not suitable for new setups so always check with your supplier before buying.

Glowlight tetra - *Hemigrammus erythrozonus*

Information about care

Food

These omnivores eat all types of live foods small enough to fit in their mouths. They will also accept algae and flake foods.

Sexing

There are no color differences between the males and females. Once mature, the females will appear larger and plumper than the males, especially when she is full with eggs.

Breeding

The male and female will entwine their fins and roll over in the substrate. The female will then position herself belly up and release between 120-150 eggs. After the male fertilizes the eggs, they will take approximately 24 hours to hatch.

Lifespan

Glowlight Tetras live approximately 2-4 years.

Origin

These Tetras come from South America in the Essequibo river.

Short Description

The Glowlight Tetra is a peaceful community fish. They can be kept with fish of similar size and temperament.



False rummynose tetra - *Petitella georgiae*

Information about care

Food and feeding

Quality flake should be offered for the staple diet. Vary the food by giving them Brine shrimp, Tubifex, and Daphnia.

Origin

South America; they are to be found in the white water streams of Peru.

Sexing

Females tend to have a plumper body shape than the males but they can be difficult to sex.

Breeding

Using alkaline water will sterilize these fish; always provide soft and acidic water. The eggs will be scattered amongst the plants, at this stage the parents should be removed. After 30 hours the eggs will hatch and when the fry are free swimming, they can be fed on Infusoria or newly hatched brine shrimp.

Lifespan

The expected life span for this fish is 3-5 years.

Short description

These are a very sensitive fish that demand high water quality. Frequent water changes are required to prevent the fish from getting common diseases. They prefer a planted tank; the addition of floating plants will settle them. Soft, acidic water should be used.



Black skirt tetra - *Gymnocorymbus ternetzi*

Information about care

Feeding

Accepts flakes, bloodworms, and nearly all food. Don't forget about enough vitamins and nutrition.

Sexing

The males' anal fin is wider than the females'. Also, the females are larger a bit.

Breeding

Breeding isn't easy. You should maintain alkaline water and wait until eggs are laid. They usually don't breed in overpopulated tanks. The fry are very small, smaller than other species. Feed them *Artemia salina*.

Lifespan

From 3 up to 6 years, maybe more.



Buenos aires tetra - *Hyphessobrycon anisitsi*

Information about care

Food and feeding

These fish will accept all foods; they do however need vegetable matter in their diet. This can be provided with blanched Romaine lettuce or zucchini.

Origin

They are to be found in Brazil and Paraguay.

Sexing

Females tend to be plumper than the males but with less coloration.

Breeding

A breeding tank with fine leaved plants should be used for breeding purposes. They will scatter the eggs over the plants, at this stage the parents should be removed or they will eat the eggs. The eggs should hatch after 24 hours and the fry will be free swimmers after 2-3 days.

Lifespan

It is believed that their natural lifespan is 5-7 years; this has yet to be proven.

Short description

These fish are tolerant of different water conditions; their biggest drawback is that

they love to eat live plants in the aquarium. These will grow larger than some tetras. They should only be kept with tank mates of a similar size.



Danios

Danios are very active fish that can stand cooler temperatures, they are very easy to keep and very cheap to buy. They will cover every inch of the tank when they are swimming about and will accept any foods.

Pearl danio - *Danio albolineatus*

Information about care

Food and feeding

Pearl Danio will accept all foods offered, their main diet should be flaked foods with treats of Tubifex, Brine shrimp and Daphnia.

Origin

These fish originate from Burma, Sumatra, and Thailand.

Sexing

The males tend to be smaller with a slimmer body shape.

Breeding

The breeding tank should be set up with a shallow water line (6 inches is ideal), and marbles should be used for the substrate to allow the eggs to fall through.

Fine leaved plants should also be added to the tank. They have been known to spawn as a group rather than pairs so add twice as many males as females to induce this. Remove the parents once all the eggs have been laid as they are prone to eat the eggs. Keep the tank in darkness until all the eggs have hatched.

Lifespan

Given the correct conditions these fish should live for up to 5 years.

Short description

The pearl Danio needs to be kept in groups of at least 4 fish. They are very peaceful, so make a good addition to the community tank. The tank should be well covered as they are prone to jumping out of the water.



Zebra danio - Danio rerio

Information about care

Food

Zebra Danios are omnivorous fish that enjoy live foods such as small insects and worms. They should also be fed algae to aid in digestion.

Sexing

Male Zebra Danios tend to be slimmer with gold and blue striping. Females are generally plumper with silver and blue stripes.

Breeding

These egg layers will produce up to 500 eggs in on spawning. Parents should be removed from the aquarium shortly after the eggs are laid. The eggs will hatch

within 72 hours and the fry can be fed liquid or powdered fry foods. The parents

Lifespan

This fish can live for approximately 5 years.

Origin

The Zebra Danio can be found in India, Bangladesh, Pakistan, Myanmar and Nepal.

Short Description

This fish is a good species for amateur aquarists to begin with. It is a hardy fish that is not demanding when it comes to water conditions.

This fish is known as Brachydanio rerio too.



Tiger danio - Devario maetaengensis

Information about care

Food and feeding

These fish are not fussy eaters so use a quality flake for the staple diet but this should be varied by offering treats of live or frozen foods twice a week.

Origin

Asia; they are native to the waterways of Thailand.

Sexing

Males have a slimmer body shape when compared to the females and will display a brighter colouration.

Breeding

Use a small breeding tank and add java moss or spawning mops to provide spawning sites. Raise the temperature of the breeding tank slightly higher than the

main tank and after the parents have been conditioned on live foods, add them to the breeding tank. Once spawning is complete, remove the parents to prevent them eating the eggs. The eggs should hatch after 36-48 hours and once the fry are free swimming they can be fed on Infusoria initially.

Lifespan

The expected life span for this fish is 3-4 years.

Short description

A peaceful species that is relatively new to the aquarium hobby. They are best kept in small groups of at least 6 specimens and ensure that there are open swimming spaces at the front of the tank.



Gourami

There are some beautiful specimens of these fish available to buy. Some of the species can be territorial especially when they are building their bubble nests but on the whole they will get on with different fish species. It is best to keep one male Gourami in the tank as two males may fight.

Kissing gourami - *Helostoma temminckii*

Information about care

Food

The Kissing Gourami is omnivorous and will accept both plant and veggie matter.

Sexing

It is very difficult to determine the sex of this fish just by looking at it. There are

minimal behavioral differences, the exception being during the breeding process.

Breeding

The Kissing Gourami is different from the rest of the anabantids in that they do not form a bubble nest when breeding. They are egg scatterers.

Lifespan

These fish can live up to 5 years in the aquarium, possibly longer if they are well cared for.

Origin

The Kissing Gourami originates in regions of South East Asia, from Thailand to Indonesia.

Short description

Despite their peaceful sounding name, the Kissing Gourami could very well be in the lip-locking position as an act of aggression in a territorial dispute. If it is male vs. male, the chances are great that this action is their way of battle. If it is female vs. male, then it is most likely an act of courtship prior to breeding.



Honey gourami - Trichogaster chuna

Information about care

Feeding

Ordinary food such as flakes, granules, worms.

Sexing

Females are less coloured than males. However, it's difficult to differentiate them sometimes.

Breeding

Bubble-nest builders like all Gouramis. Feed fry Artemia Salina.

Lifespan

2-5 years. Keep in planted tank.



Pearl gourami - Trichogaster leeri

Information about care

The Pearl gourami requires a medium to large tank with lots of plants and gentle filtration. Very peaceful, they tend to be rather social and should be kept in groups. They make a nice addition to any community aquarium. Pearl gouramis are accepting of most foods and should be given spirulina flakes to completely balance their diet. Rather susceptible to swim bladder disorders. The male is generally more colourful with a darker orange hue near the anal fin. Bred in a 40l tank, filled halfway, with lots of floating plants. Increase the water temperature slightly, and watch as the male begins constructing a bubble nest. The male wraps around the female and spawning takes place. The female must be removed, as the male's becomes very protective over the fry and may attack the female.



Acclimatising your fish

When you have purchased the fish and are going to place them in the tank, don't be tempted to just put them straight in. You need to get them used to your tank water gradually as a large sudden change in water parameters can affect the health of your fish.

When you get your fish home, place the unopened bag into the tank and let it float for 20 minutes, this will equalise the temperature in the bag and the tank water.

Now open the bag and roll down the top so that it will float on the surface, gradually adding tank water to the bag and removing some into a bucket. Keep repeating this process every 5 minutes until you are sure that the dirty water from the bag has been removed then carefully net the fish and slowly add them to the tank. Remove the bag and the water inside it; never be tempted to pour the water into the tank.

Leave the lights on the tank turned off for an hour to give the fish time to settle and they should colour up very quickly.

6. Aquarium Plants for Beginners

One of the most beautiful aspects of fish keeping has to be seeing a well planted tank that is proportioned properly so that it looks great to any observer. Keeping plants in the aquarium does not have to be that difficult a task, there are a few simple rules that can make life a lot easier.

The benefits of adding live plants to your tank are mainly that they will feed off the fish waste and any nitrates in the water; basically they are acting as a natural filter. I personally do not like the look of plastic aquarium plants; they lack the beauty of real plants and can dampen the overall look of the finished tank.

As with any other plant out of the water, they all have their own needs and different requirements to keep them happy but many species will adjust to your tank and still thrive. The largest problem can be keeping them pruned back as the start to create an underwater jungle, regular maintenance of them will keep everything in order.

Even with hardy plants it is always best to check out the conditions they prefer before you add them to the tank as dying and decaying plants can cause a massive change to your water parameters. Take into consideration the required pH and hardness of the water, all of this information should be supplied by your plant supplier, and also check on their lighting requirements.

At aqua-fish.net there is an article covering this topic:

*See the article named **Why have a Planted Tank?**; it can be found in chapters above.*

To give your plants the best start in life you will need to use a substrate that is capable of feeding them initially until their root growth can absorb other nutrients from the fish waste. You can anchor the plants in gravel and add root tabs which will feed them or you can also purchase liquid feeds that are simply added to the water. Some suppliers can even sell you substrate that has been purposely designed for the use of growing plants.

Different species of plants will also require different levels of lighting, some can survive in very low lighting but others require lots of light for successful photosynthesis. All of this information should also be on the plant profiles for you to research.

At aqua-fish.net there is an article covering this topic:

See the article named **LIGHTING FOR AQUARIUM PLANTS**; it can be found in chapters above.

One of the biggest mistakes that keepers can make if they are new to keeping plants is to add them to a tank full of plant eating fish. This is quite common and the plants are eaten away but the unsuspecting keeper is blaming the water parameters. Some species of fish may not actually enjoy eating the plants but they will take great pleasure in uprooting them and moving them around. Oscars and Goldfish are two classic examples of these fish. This can be avoided if the plants are added to the tank in a clay pot but the fish will still do their best to move them about.

Below is a list of plants that are suitable for beginners, they are very hardy and should grow with no problems, some may be slow growers but others will excel and give you a gentle introduction into the art of pruning.

Amazon Swords

These come in normal or dwarf varieties. When you first purchase them they may be quite small but can grow up to 18 inches tall. They have lance shaped leaves and propagate by sending out runners. The dwarf variety may only reach 12 inches in height but they make great plants for many fish to spawn on, Angels are particularly fond of using these plants for breeding. It is beneficial to add some root fertiliser when planting these.

Java Fern

This plant is about the hardiest plant you can add it should never be planted in the substrate but attach it to a piece of wood or similar. They are not eaten by fish as they are renowned for having a repellent taste. They propagate by producing miniature plants at the tip of their leaves.

Anacharis

Long stems will reach right up to the surface but these do require liquid feeds for the best growth. Propagation is normally done by taking cuttings and bunching these to create another plant.

At aqua-fish.net there is an article covering this topic:

ANACHARIS

Anacharis must be one of the most popular aquatic plants available on the market. There is a lot of debate as to the name of this plant; there are various common names such as Brazilian waterweed, elodea, and recently it has been classified as being Egeria Densa.

This must be one of the most versatile plants available to buy on the market, and definitely one of the most popular for new fish keepers to have their first attempt at keeping live plants. However, if it is not given the right conditions, it can just as easily melt down, like all other plant life.

Anacharis is native to North and South America, where it can grow abundantly, in some areas it is even classed as an invasive plant. As it is so abundant, this reflects on the price, it is one of the cheapest plants to buy, another good reason for its popularity.

It grows long stems, these will reach from the substrate right up to the surface, it has even been known to reach a height of 3 feet. The colouration of the leaves can vary from light green to a rich dark green, thickly protruding from each stem.

According to the water temperature that it is kept in, if the stems are not planted in the substrate, they will float at different levels; this is more noticeable when kept in outdoor ponds, not very often observed in aquariums. This is due to the photosynthesis that takes place in the plant when it gets the correct lighting; it is used in ponds as an oxygenating plant, probably one of the best plants for this purpose.

As this plant is so versatile, some keepers will purchase it by the bunch with a lead weight attached, and then just place it in the tank, it can be placed in the tank loose and allowed to float on the surface. My preference is to buy a bunch, and then remove the lead weight; the stems can then be separated and planted in the substrate individually. A group of six stems, planted 2 inches apart, makes a good effect, and to me looks more natural. A lot of fish keepers use this plant to disguise their tank heaters and filter pipes. It can also provide a safe haven for newly hatched fish fry if left floating on the surface. Two watts per gallon of water is the recommended lighting required for this plant, but if too much lighting is offered, the leaves will turn yellow and the plant will die off.

As with all tank or pond plants Anacharis will feed of the CO₂ in the water, nitrates and phosphates will be consumed, this will improve the water quality greatly. In theory this should reduce the amount of water changes required in the tank, however the plants will grow at a greater rate when they have first been planted if the water changes are still done on a regular basis. The nutrients are consumed through the leaves but if the stems are planted in the substrate, roots will

develop, these in turn will feed on fish waste and detritus from the substrate. Algal growth will be suppressed with the inclusion of Anacharis but once established, regular pruning will be required to keep it in check.

Propagation is very straight forward, simply take cuttings from the mother plant and then plant these to create yet another bunch of plant. Fertilisers need to be added to the tank water to get the best growth results, along with a good CO₂ system and lighting.

In ponds, this plant is valued more for its oxygenating prowess, many pond keepers swear by it.

There are some drawbacks with Anacharis though, algae eating fish will greedily destroy your plant, it is regarded as a tasty meal by them, snails will do the same, some fish keepers will add it to the tank so that the fish are fed while they are away for periods of time, even some bacteria will thrive on Anacharis if it is chopped down finely. Infusoria is a prime example of this. Plecos and catfish will also love feeding from this plant, so if you do end up with lots of cuttings what a better way of using them than by feeding your fish.

Anacharis will spend all its life underwater but if the plant is really happy where it is growing small flowers will appear above the water line. The flowers will be white or a pale purple and these will be sent out from the main stems by means of a thin delicate stem. Different plants will either have male or female flowers, so to produce seeds they will need to be cross pollinated. This can be achieved by using a small paint brush rubbed across all of the flowers or by the natural way if the plants are in a pond, let the insects do the work.

If pollination has taken place the seeds that are produced will need to be submerged to ripen properly, but I have yet to meet anyone who has gone to the extent of trying this, the plants are cheap enough to buy as stems.

A close relative to Anacharis is Elodea Nuttallii, the main difference between the two is the size of the leaves, in the Nuttallii the leaves are smaller and narrower, whereas in the Anacharis the leaves appear on the stems as dense whorls, there are three leaves per whorl.

Any pond or tank keepers must always bear in mind that this is an invasive plant. If the tank has been pruned back the cuttings, if not required for further planting should be placed in a bag and disposed of carefully. Never throw the cuttings into waterways, natural ponds or streams; it will eventually take over all of the original plant life, destroying the natural habitat created.

Always supply this plant with the correct requirements for growth, it is classed as

a hardy plant, but if not looked after properly, it can melt down in a matter of weeks.

Hornwort

This is a very versatile plant; it can either be planted in the substrate or left floating on top of the water surface. A very common plant enjoyed by many keepers. With the right lighting, the stems can grow up to 1 inch per day but it is one of the best plants for pulling out the unwanted waste products from the water.

At aqua-fish.net there is an article covering this topic:

Ceratophyllum demersum

- Maximum size: 10 - 80 cm (3.94 - 31.5 in)
- pH of water: 6.2 - 7.5
- DH of water: dGH 4 - 18 °N
- Recommended temperature: 21 - 28 °C (69.8 - 82.4 °F)
- Recommended substrate: Sand
- Light conditions: Bright
- Place in aquarium: Background
- Way of propagation: Rhizome
- Plant origin: South America
- Growth: Fast

Anubias

This is a very slow growing plant that requires no pruning, do not plant this in the substrate but attach it to a piece of wood or similar. The new leaves will be bright green when they emerge but will darken with age.

At aqua-fish.net there are articles covering this topic:

Anubias barteri

Maximum size: 25 - 40 cm (9.84 - 15.75 in)

pH of water: 6 - 7.5

DH of water: dGH 4 - 18 °N

Recommended temperature: 22 - 26 °C (71.6 - 78.8 °F)

Recommended substrate: Fine gravel

Light conditions: Medium

Place in aquarium: Middle

Way of propagation: Rhizome

Plant origin: Africa

Growth: Slow



Anubias barteri "Nana"

Maximum size: 5 - 15 cm (1.97 - 5.91 in)

pH of water: 6 - 7.5

DH of water: dGH 4 - 12 °N

Recommended temperature: 23 - 25 °C (73.4 - 77 °F)

Recommended substrate: Gravel

Light conditions: Subdued

Place in aquarium: Foreground

Way of propagation: Rhizome

Plant origin: Africa

Growth: Slow

Information about care

Very beautiful aquarium plant, but very difficult to grow. Use fertilizer for initial acclimatization.

Older leaves become dark green and new ones are light green. Make sure that the rhizome is attached to gravel or rock properly, otherwise the water current will make it a floating plant.

Great addition for the Panda Cory fry which like to hide there.



Vallisneria

There are many species of this plant, it's long fine leaves make a great backdrop to any aquarium. It may be slow growing to start with but once the roots take hold the leaves will soon reach the water surface. This plant propagates by sending out runners and can soon start to spread out so it will require occasional pruning of the young shoots.

At aqua-fish.net there are articles covering this topic:

***Vallisneria spiralis* (Italian)**

Maximum size: 30 - 55 cm (11.81 - 21.65 in)

pH of water: 6.5 - 7.6

DH of water: dGH 4 - 18 °N

Recommended temperature: 22 - 28 °C (71.6 - 82.4 °F)

Recommended substrate: Fine gravel

Light conditions: Medium

Place in aquarium: Background

Way of propagation: Runners

Plant origin: Europe

Growth: Fast

Information about care

Great addition to the aquarium. Can grow really fast, but acclimatization should be initially supported by fertilization. JBL balls are suitable.

This plant can grow in entire aquarium because it helps fish to hide. Small Bristlenose Catfish will use Vallisneria for climbing at the top levels during the feeding time.

Vallisneria spiralis is suitable for a South European biotope, or for a North African biotope.



Vallisneria torta

Maximum size: 30 - 45 cm (11.81 - 17.72 in)

pH of water: 6.5 - 8

DH of water: dGH 4 - 18 °N

Recommended temperature: 22 - 27 °C (71.6 - 80.6 °F)

Recommended substrate: Fine gravel

Light conditions: Bright

Place in aquarium: Background

Way of propagation: Runners

Plant origin: South Asia

Growth: Fast

These are just a few examples of the many plants available, shop around to see what is available or go on the net to check out the online suppliers. One should always remember that when the plants are removed or pruned back, the excess plants should never be thrown into the water ways as some can take over from the natural foliage.

When you start to get knowledge of growing plants and you wish to try less hardy species you may need to invest in a CO₂ unit. These basically add extra CO₂ into the water to aid photosynthesis, some are cheap to buy but others can be quite expensive.

The following article explains how they work.

*See the article called **Aquariums And CO₂ Systems** in the chapters below, please.*

CO₂ systems are not always required in your tank if you are growing plants, they are usually only needed for the more delicate species that need a lot of lighting, research all the species of plants you are thinking of keeping and only use the ones that will be happy in the tank that you are using.

7. Fish Diseases and How to Cure Them

Fish disease are not only stressing for the infected fish but will also stress the fish keeper wondering if the disease could have been prevented. Some species of fish are more prone to diseases than others, this is a fact of life but a lot of the infections can be avoided by preventative measures. Not only does disease in the tank wipe out a lot of costly stock but it does cause suffering to the fish which nobody wants.

There are many bacteria and parasites that spend their whole life looking for host fish to prey on but by keeping the water quality high and the tank clean a lot of these can be avoided. It doesn't matter how much we look after the fish, there will always be problems associated with sickly fish such as tumours, weak hearts, TB, and diabetes. Poor quality breeding practice can increase the chances of your livestock inheriting these weak genes so always purchase quality stock, they may cost more but in the long run they will survive far longer than inferior fish. If your fish has a strong immune system and is in good health, recovery from infections or parasites should be a lot quicker and the tank a lot easier to keep disease free. Infections and parasites will do their best to waken the immune system of the fish, this in turn will lead to stress so now we are not dealing with one issue but several at the same time.

To prevent most of these it is important to:-

1. Keep the water quality high
2. Feed the fish with a healthy diet of quality foods
3. On a daily basis, look at your fish to see if they are behaving differently, catching a problem early is the key to success.

The main symptoms to watch out for are rubbing against décor in the tank, loss of appetite, fins clamped down to the body, gasping at the water surface, hiding at the back of the tank, sporadic swimming. If any of these signs are observed it will probably mean that the fish has developed an infection of some sort. The next step is to keep observing to track down exactly what the problem is.

There is a great deal of detective work involved in trying to work out exactly what is wrong with a diseased fish, they can't turn around and tell you so the clues have to be spotted by yourself.. Never guess what is wrong with your fish and start adding medications to your tank unless you are sure what ailment your fish has. Seek advice if you need it from someone with a lot of experience in treating fish. There are only a few ways that the fish can let you know that something is wrong so it is often a case of narrowing down certain symptoms that are associated with certain diseases.

Why is water quality so important?

The most common mistake that many fish keepers make is thinking their tank water is perfect as it is so nice and clear, this is not always the case. Just because it looks good, how are you sure that the water parameters are suitable for your fish. Any variance in these can stress the fish and weaken the immune system leading to secondary problems with infections and parasites.

We need to know that the ammonia levels and nitrite levels are low or indeed non-existent, any present in the water are extremely toxic to the fish and will possibly damage fish tissue; they will definitely stress the fish.

Are there any chemicals in the water that will affect the fish, chlorine, chloramines and heavy metals, even at low levels can affect the health of the fish, any water added to the tank must be treated with a suitable water conditioner that will render these harmless. Some treatments that may have been added to the tank in the past may contain these, running carbon in the filter after each course of treatment should remove them.

Could it be that we are keeping our fish in the wrong water parameters altogether. Every species of fish prefer to live in a narrow range of hardness, pH, and temperature. When they are kept outside of this range the fish will lose their full immunity and can be generally unhappy.

Dissolved organic compounds (DOC's) are a constant threat to the tank they build up as a result of decaying matter, uneaten food, and generally poor filtration. Good tank maintenance should keep these low, regular gravel vacuuming and glass cleaning helps a great deal.

Do the water parameters change over a 24 hour period?

The pH is always fluctuating through this period but if the hardness is alright then the variation should be minimal and not affect the fish. Large swings will certainly weaken fish so this should be watched and random checks done throughout the day.

All good fish keepers are proud of the way the tank looks and claim that their water is perfect but unless we constantly monitor it how can we be so sure.

The following articles cover various fish diseases and their treatments:-

Aquarium fish diseases

common diseases, symptoms, treatments, and prevention

Preventing disease

Quite a few aquarists routinely treat their fish against various health problems or even retort to constantly keeping the salinity level high in their freshwater aquarium just to prevent outbreaks of certain contagious diseases. The problem with such an approach is that keeping a fish in a suboptimal salinity level and exposing it to various treatments will weaken it in the long run. If you want to keep thriving fish instead of barely surviving fish, prevention is a much better solution than continuous use of salt and disorganized emergency treatments.

Here are a few suggestions that can decrease the risk of disease in your aquarium.

- 1.) Keep your fish in an optimal environment, i.e. optimal water temperature, optimal salinity, optimal pH-value, low levels of organic waste, and so on. Always read up on all species you plan on keeping and do not combine species with dissimilar preferences.
- 2.) Avoid stress in the aquarium by including suitable hiding spots and keeping bullies in check. Do not combine aggressive fish with species that can't fend for themselves, fin-nippers with delicate long-finned fish and so on.
- 3.) Feed your fish a balanced, nutritious and varied diet. Read up on each species to learn more about its preferred diet.
- 4.) Always quarantine new organisms in quarantine tanks before they are allowed to enter the aquarium. You need to quarantine even healthy looking fish, because many diseases take time to manifest and are contagious long before you can notice any symptoms of poor health.
- 5.) Sterilize all new items before placing them in the aquarium, e.g. by cleaning them with bleach. (Keep in mind that most detergents are unsuitable for aquarium use.)

Five very common diseases in freshwater aquariums

Freshwater ich / White spot disease (*Ichthyophthirius multifiliis*)

Freshwater ich is caused by the parasite *Ichthyophthirius multifiliis* and is commonly known as White Spot Disease since white spots is a characteristic symptom. The white spots are actually cysts and can look like grains of salt on the skin of the fish. When a cyst is mature, it will fall off the fish and sink down to the substrate where thousands of new parasites will emerge. The parasites will enter a free-swimming stage and scout the aquarium for suitable hosts. When a

parasite has found a fish, it will attach itself and form a new cyst.

As mentioned above, the most characteristic sign of ich are white spots on the skin of the fish. The fish can also scratch itself against rough surfaces in the aquarium and experience laboured breathing.

Since the parasites go through a free-swimming stage, this disease is highly contagious and the entire aquarium must be treated. The parasite is only vulnerable to treatment during its free-swimming stage and you must therefore carry out several treatments at regular intervals to make sure that all parasites are dead. If you ask ten different aquarists about the best method of treating ich, you may very well end up with 12 different answers. A commonly used method is adding salt to the water, ideally slowly over time as not to chock the fish. Different fish have different salt tolerance, but it is advisable to get up to at least 25-40 teaspoons of salt per 20 L of water. Another popular remedy is malachite green, but this medication should not be added to aquariums with scaleless fish.

Many aquarists turn up the water temperature when combating ich since this speeds up the life cycle of the parasite, but you should keep in mind that a sudden increase in water temperature can stress fish and lower the oxygen levels (which is especially problematic for fish already experiencing laboured breathing).

Velvet / Gold dust disease (Oodinium)

Velvet is also known as Gold Dust Disease and both names allude to the appearance of infected fish. Before it turned out to be a disease, many aquarists actually appreciated having velvet in their aquariums since it gave the fish an appealing look. The disease is however almost always fatal if left untreated in aquariums. In freshwater, velvet is typically caused by dinoflagellate parasites of the genera Oodinium. Some fishes, e.g. danios, are more prone to velvet than others, and they can serve as breeding grounds and cause the amount of parasites in the aquarium to become so high that even more resilient species eventually succumb.

The most characteristic symptom of velvet is a velvety appearance, sometimes with a golden or brownish layer of “dust”. The “dust” will usually appear around the gills first and then gradually spread to other parts of the body. Infected fish may clamp their fins, scratch their skin against rough surface in the aquarium, and experience laboured breathing.

Species especially prone to velvet can usually live with the disease for quite a long period of time, but this doesn't mean that you should put off treating them. Velvet is usually treated with acriflavine (trypaflavine) or copper depending on which species you house in your aquarium. A standard dose is 0.2 mg of copper/L or 1 ml of acriflavine (trypaflavine)/L. It is very important to calculate the exact amount of water in your aquarium, because both treatments are dangerous to fish.

Carry out a series of small and very frequent water changes as soon as the treatment is over.

Argulus / Fish lice

Argulus, also known as fish lice, is a crustacean parasite that will attach to the fish using curved hooks and suckers. This parasite has a direct life cycle and will only infest fish. Mating takes place during the free-swimming stage of the lifecycle and egg clusters are released in the aquarium. After being hatched, the parasite must find a suitable host within four days, otherwise it will die. The whole life cycle takes between 30-100 days depending on water temperature.

When the parasite has attached itself to a fish, it will insert its needle-shaped mouth into the tissue. This parasite causes patches of swollen and bleeding skin and can affect the entire body, including fins and gills. It feeds on blood and other bodily fluids, and it causes further harm to the fish by injecting digestive enzymes that can lead to systemic illness. It is sometimes possible to see the parasite with a naked eye because this oval, flat parasite can reach a length of 10 mm. Other symptoms are small dark spots on the skin, typically behind the fins and around the head. Affected fish are known to clamp their fins and scratch themselves against rough surfaces in the aquarium.

A 10-30 minute long potassium permanganate bath (10 mg potassium permanganate per litre water) is usually enough to kill the argulus parasite. In some situations, you have to treat the entire aquarium to get rid of them by adding 2 mg potassium permanganate per litre. It is possible to pick off the parasite from the fish with a pair of forceps, but it can be tricky to find all the parasites and remove them.

Columnaris (Chondrococcus columnaris)

Columnaris is commonly known as mouth fungus, but it is actually caused by a bacterium named *Chondrococcus columnaris*. It is usually a sign of poor water quality in the aquarium, so you need to start carrying out more frequent water changes if this problem manifests. Newly introduced fish are especially susceptible to the bacterium.

The first symptoms of columnaris are usually grey or white lines or patches on the body of the fish, especially around the mouth. It can look almost like cotton. The fish will have a hard time eating and the bacteria will also release toxins that weaken it further. The fins can start to deteriorate and if the gills become affected the fish will experience trouble breathing. A severely infected fish will usually clamp its fins.

Since this disease is caused by bacteria, antibiotics are usually required. It is important to treat as soon as possible, because when the disease has spread to the internal organs the chance of raring your pet back to health is slim. One example

of a recommended treatment is 10-20 mg of chloromycetin per litre water. After the initial dose, it is important to follow up with a second dose two days later.

Dropsy

Dropsy is a common aquarium disease that will still know very little about. Most experts believe that it is caused by bacteria, but some have suggested that viruses may be able to cause dropsy as well. Dropsy is especially common in fish that is already weakened by something, such as poor water quality or improper diet.

The main symptom of dropsy is a swollen or hollow abdomen. The scales of the fish can also stand out over the swollen areas, giving the fish a “pine-cone” appearance. An affected fish will typically become listless and lose its appetite. The kidneys become damaged which leads to fluid accumulation and/or renal failure.

Dropsy is difficult to treat and often fatal. In many cases it is best to euthanize affected fish to save it from suffering and prevent the problem from spreading to other fish. If you wish to treat, it is possible to medicate the water, but if your fish is still eating it is better to give it medicated food since this is an internal disease. Purchase chloromycetin or tetracycline (other antibiotics can work as well, but check with a vet or experienced aquarists to be sure) and make a 1% food mixture. This means a standard 250 mg tablet is enough for 25 g of fish food.

Diseases of Goldfish

Goldfish are known to be highly susceptible to various diseases because of all the selective breeding that takes place. Common and comet goldfish are the hardier variations of all the goldfish varieties available in the aquarium industry. The fancier, more selectively bred varieties of goldfish are more apt to contracting the various diseases that can ail goldfish. Books and internet websites on fish diseases can be your best source of information to finding out all about goldfish diseases. It is highly recommended to have access to either or both of these sources of information when owning goldfish, especially the fancy varieties of goldfish.

Prevention:

Disease prevention is the best solution to any type of fish disease. Although prevention does not always work 100% of the time it definitely improves the odds of having healthier goldfish.

- 1. The first step in disease prevention is choosing only the highest quality fish for purchase. When looking to purchase a new goldfish approach the task with high standards in mind. If the aquarium retail store has dirty fish tanks that contain unhealthy and unhappy looking fish, chances are your fish will not survive for very long. If the stores tanks appear to be in good,

clean, healthy conditions and contain fish that appear robust and hearty, chances are your fish will continue to thrive as long as it is well taken cared of once you have purchased it.

- 2.The second step to disease prevention is keeping the aquarium water at optimal quality. Goldfish have the tendency to produce a lot of waste and yet are fairly sensitive to unclean water. When keeping goldfish it is highly advisable to provide good water filtration and to perform plenty of partial water changes. Be careful not to over feed them because goldfish have short digestive tracts and no stomachs which mean they absorb less of the foods they eat and excrete most of it as fecal matter back into the water. The increased levels of waste cause higher levels of ammonia to buildup in the water over shorter periods of time which can lead to many different health problems. By changing the water often and keeping it well filtered most health problems can be prevented.
- 3.Adding a little bit of aquarium salt to the fish tank may help to prevent some of the diseases that goldfish are prone to. Ich and fungus are unlikely to develop even if small traces of saline are detectable in the aquarium water. The key is to keep only minimal amounts of aquarium salt in the tank water so that you can add more if it is needed in the event of an outbreak of some sort. Definitely be cautious not to add too much salt to the water because goldfish are not marine animals and can only handle slight amounts of salinity.

Medication and Chemicals:

Medication and chemicals should definitely not be used as a prevention method of dealing with diseases for goldfish or any other fish. It is very important to consider limiting the use of medications in the aquarium. Using medicine only when it is absolutely necessary will increase its chances of working properly when it is actually needed. If medications are constantly present in the aquarium different strains of certain diseases are likely to develop; strains of disease that become resistant to the medications causing medicine to become ineffective. As each goldfish disease is listed below, the proper medications and treatments will be mentioned.

What not to do:

Once you know the common diseases and conditions a goldfish can suffer you should be able to provide better care for your own goldfish. However there are several things that aquarists often forget when dealing with sick fish. So here is a short list of things to remember not to do.

- Do not add additional fish to the aquarium until your fish are free and clear of disease and stress. Do not over crowd the aquarium because that will

cause a whole mess of problems. Stress levels, waste levels, chemical levels such as ammonia, nitrite and nitrate will rise.

- Do not use multiple medications unless it specifically says it is safe to use in conjunction with one another, usually different medications of the same brand will allow to simultaneously use two different medications.
- Do not perform too many complete water changes or move your fish around unless it involves moving the sick fish to the hospital tank. Disturbing the tank too much will cause more stress to the fish which will then cause the fish to not be able to heal from their present ailments. As much as possible try to do partial water changes as you would normally do to keep the water conditions up to standard.

Disease/Conditions and Treatments:

- **Ich:** Ich or ick is short for Ichthyophthirius multifiliis, which is one of the most common diseases among most fish. This is a disease that appears as white spots that look like grains of salt on the skin and gills. Usually brought on when the fish is experiencing a lot of stress or when new fish are introduced into the aquarium. The first thing to try is raising the temperature and adding saline to the aquarium water. Be aware of the type of fish you have because not all fish can handle salt in the water. Loaches, corys, snails and some aquatic plants are especially sensitive to it and may die if there is too much salt in the water. If that does not work you can try using medications that contain copper.
- **Fungus:** Fungus can often form at the site of wounds or sores like an infection. The fungus will appear like a little ball of cotton at the edge of the open wound and it is caused by bacteria. There is an antibiotic called Maracyn that treats bacterial infections to help get rid of fungus.
- **Swim bladder disorder:** Swim bladder disorder is common among fancy goldfish with shorter, rounder bodies. This is because their swim bladders are developed differently due to their compromised shapes. Goldfish are selectively bred to create the round shaped bodies and high hunched backs so the shape and position of each of their organs are not always as it should be. The swim bladder is an organ that maintains a fish's equilibrium allowing it to swim normally. If that swim bladder is not functioning properly it can cause high stress to the fish and eventually lead to death. Doing a complete water change could be the best solution because studies show that a nitrate-free environment can cure swim bladder disorder.
- **Gasping at the surface:** Gasping at the surface or labored breathing, the fish is not getting enough oxygen. High temperatures, saline, and elevated

chemical or medicine levels can cause the oxygen levels to go down. This one condition where these treatments are not recommended. Check to see that your filtration system is working properly. Also check to make sure there are not any oils or scum on the surface of the water. Gas exchange at the water's surface is how the fish get their oxygen so make sure there is a certain amount of agitation at the water's surface. If there is any amount of oil or scum preventing the water from absorbing the oxygen it should be taken care of it right away. Scoop water from the top of the water's surface until it seems like the gunk is gone. It is very important to have plenty of surface area with sufficient agitation or water movement where oxygen can enter the water.

- **Constipation:** Constipation is common and easy to solve problem for goldfish. Goldfish do not have stomachs to hold onto their meals for the digestion process. All they have are short digestive tracts through which their food quickly passes. It is important for their proper nutrition that their foods are quickly digestible and easy to pass. That is why special foods are made for goldfish; to absorb as much nutrients as possible over a short amount of time. When a goldfish becomes constipated it could cause other problems such as swim bladder disorder so it is important to solve the problem right away. You may notice your goldfish looking lethargic and swollen which are clear signs of constipation. Stop feeding your goldfish his normal flake or pellet foods for a few days and start giving him some veggies. Just like humans, fish can benefit from well balanced diets. Spinach, peas or lettuce leaves can be fed to your goldfish if you cook them until they are soft enough for the fish to digest. When you go back to feeding flakes and pellets to your goldfish it would help to first soak the food in water to soften it for ease of digestion.
- **Fin and tail rot:** Fin and tail rot are symptoms of stress due to poor water conditions, over crowded tank, or rough treatment by humans or other fish. It is a very easy to recognize condition where the fins and tail of the goldfish become shredded or they rot away. Fin and tail rot is caused by several types of bacteria in the water. The first course of action to take is to do a partial water change and then add antibiotics such as Maracyn 2. This should get rid of the bacteria that cause the fin and tail rot condition, but to treat the damaged goldfish fins there is a medication called Melafix that aquarists use to treat wounds and repair fin damage.
- **Pop eye:** Pop eye is a condition, not quite a disease that is characterized by the eyeball popping out of the eye socket. It can have several different causes: water of poor quality, infection from bacteria, or inflicted injury from other fish. Pop eye is the result of swelling and retaining fluid behind the eye area causing it to bulge. The first form of treatment for Pop eye is to separate the sick goldfish into a hospital tank with very clean water and well aerated water with no activated carbon filter. Sometimes just that can

help to reduce the swelling and infection in the eye, but if it does not then treat with Tetracycline which is a full range of medications that treat bacterial infections.

- **Dropsy:** Dropsy is a disease that presents symptoms such as swelling of the abdomen which then causes the scales of the fish to stick out from the body. These symptoms are caused by the buildup of fluids in the fish's abdominal area and the goldfish will become lethargic and uninterested in food. Bacteria or contaminated food could very well be the cause of this disease which means that it can be treated through the use of a broad spectrum antibiotic. If the cause of the Dropsy is neither contaminated food nor bacteria it could be due to kidney, liver or heart failure, in which case it cannot be treated with any medications.
- **Hole in the head disease:** Hole in the head disease affects goldfish as well as all other freshwater fish. It is not known for sure what causes this disease but there is speculation that it could be caused by bacteria, parasites, nutrient deficiency, or poor water quality. This is a progressive disease in that it takes some time to develop. First a series of small holes will appear on the head of the goldfish then mucus will seep out through the holes and the fish's slime coating will start to come off. If this disease is caught early there is a chance that the fish just might survive. The first step to treating hole in the head disease is to isolate the diseased goldfish to a hospital tank with fresh, clean water. There is a water conditioner called Stress Coat that contains Aloe Vera which promotes healing and will replace the slime coat for your goldfish. Be sure that your goldfish is getting a well balanced diet with all the important vitamins and nutrients. Sometimes these treatments along with the addition of salt to the aquarium can be enough treatment to stop the progression of this disease. Otherwise a radical treatment of Metronidazole can be a last resort. This treatment is used to kill the specific bacteria and parasites that are believed to cause Hole in the head disease but are not proven.
- **Costia:** Costia is a disease caused by quick moving parasites. This disease exhibits symptoms that look like slime patches on the skin of the infected goldfish. The skin turns a milky color and the fish might also have difficulty breathing. This condition, if not dealt with swiftly will potentially lead to death. Treatment starts with raising the temperature in the aquarium to 80-83°F then treating with medication. There are two medications that are equally effective but each one has a different side effect. Copper Safe works well but can be very toxic to certain fish. Be sure to read the label to see if your fish are able to handle this treatment before using it. Acriflavine is the other medicine that works well but the fact that it can cause sterility in fish might not make this an acceptable treatment for your aquarium.

- **Trichodina:** Trichodina is a parasite that implants itself in the skin and gills of goldfish and other freshwater fish causing the fish's skin to become itchy and irritated. This disease is very noticeable because you will see the goldfish scratching against surfaces which can cause ulcers and stress. This condition is usually due to poor water quality with high bacteria content. This parasite feeds on bacteria so improvement of water quality is one of the main solutions to this problem. Salt can also be a very effective solution except that there is a strain of this parasite that has developed a resistance to salinity. In this case use Quick Cure as directed and the trichodina should be cured.
- **Velvet:** Velvet is a parasite that infects the skin of both fresh and salt water fish. It is also known as Gold Dust Disease because of the gold, dust-like appearance which also gives the skin of the fish a velvety-looking texture. The infected fish will scratch against surfaces, have difficulty breathing, and even become lethargic. The first course of action to treating this disease is a partial water change. Fresh, clean water with dim aquarium lighting and a little bit of aquarium salt could cure minor cases of velvet if the condition is caught quickly enough. Otherwise, medicines such as Quick Cure or Copper Safe can be added to the aquarium to eradicate the parasite completely.
- **Body and gill flukes:** Body and gill flukes or Shimmies are parasites like small worms that infect either the body or the gills, or both at the same time. The flukes that infect the gills are different from the flukes that infect the body of the goldfish because they each reproduce differently. The gill flukes lay eggs in the substrate while the body flukes give birth to live young. It is more difficult to completely get rid of gill flukes because of their egg-laying reproduction. An infected fish will scratch against surfaces, have an extra thick slime coat, have difficulty breathing, and can sometimes become lethargic. Potassium Permanganate is one treatment that can be used for flukes but it can get fairly expensive. Quick cure is another possible treatment but is not always considered to be as effective. Repeat treatments at least two more times after initial treatment to ensure all gill fluke eggs are killed, otherwise the problem will persist.
- **Anchor worm:** Anchor worm is a highly contagious parasite that infects fish even when they are not weakened due to stress. This parasite will burrow into the skin, gills or even the eyes of a goldfish or other freshwater fish causing skin irritations. They get to be about a quarter of an inch in length so they are very visible to the eye without a microscope. The worms can burrow deep down into the organs of the fish if the problem is not taken care of quickly enough. Treatment for anchor worm can be as simple as pulling out the worm with a pair of tweezers or treating with a medicine called Anchors Away, which is especially effective when it comes to removing anchor worms and other parasites.

- **Fish lice:** Fish lice are parasites that can be seen without a microscope and has the freedom to move around on the goldfish. The fish will scratch against surfaces which can cause skin irritation and sores giving bacteria breeding ground to cause secondary infections to the fish. This very contagious parasite will lay multitudes of eggs each of which will hatch and find hosts of their own. Anchors Away is a very effective treatment for fish lice. Repeat treatments are highly necessary because this medication will not kill lice in their egg form. After the lice seem to be completely gone it has been known to reappear due to un-hatched eggs so be sure to treat, treat and re-treat very diligently.
- **Columnaris:** Columnaris is also known as cotton mouth disease because of the white spots that appear on the mouth of the goldfish and other freshwater fish. Not only do these cotton-like growths infect the mouth area but it can also infect scales and fins. It is easy to mistake this condition for fungal infections but it is in fact bacteria that are named for its column-like shape. Clean and fresh water and aquarium salt is one treatment for columnaris but copper sulfate can be much more effective if needed.
- **Melanophore Migration:** Melanophore Migration is characterized by black spots forming on the otherwise healthy goldfish. The melanophore is a pigment containing cell that can control how dark or light the skin pigment will be. It is because of melanophore cells that an animal can change its skin color to camouflage itself. This condition can come about when the goldfish is experiencing stress due to poor water quality, or it can be a secondary infection inflicted by parasite infestation. A simple water change can be the solution to curing this ailment. Once the aquarium water is clean you will have to wait awhile for the black spots to disappear.

Ich; The White Spot Disease

Ichthyophthirius multifiliis is one of the most common diseases encountered by freshwater aquarists. It is a parasite that attaches itself to the skin and gills of fish, forming white spots that look like grains of salt. You may or may not notice an infected fish “flashing”; a behavior that is characterized by quick rubbing or scratching up against logs or rocks. This parasite digs into the victims’ epidermis while feeding on the blood and cells of the host. Some of the common names of this parasite are ich, ick or white spot disease. In addition to feasting on a fish’s mass, this parasite will also add stress and lower immunity. As if things aren’t bad enough with just having to deal with a parasite, this opens up the infected fish to bacterial infections and respiratory dysfunction.

Rarely will Ich go unnoticed, but the earlier you catch it the better. Without proper action taken it will be deadly, especially if the fish are not already in a healthy state of being. Ich is highly contagious, so if you see one fish has been

infected, you can be sure the others are not far behind. You can quarantine an infected fish, but sometimes even then, it is too late. In order to understand how to treat ich, it is helpful to understand the life cycle of the parasite.

The first time you will notice the parasite is in the TROPHANT phase. The parasite digs its way through the protective mucus of the fish's skin and develops a hard shell. The hard shell is actually a cyst that becomes visible and is what makes the fish appear to be covered with grains of salt. It is hard to treat the parasite in this stage because it uses the fish's skin as its own protective layer along with the hard shell it has created.

After the Trophant phase the parasite matures and develops into the TOMONT phase. During this phase the parasite is still immune to treatment because of its protective outer layer. The cysts fall from the skin of the fish to the bottom of the tank. Once it has done this, it will separate and divide inside of the outer shell.

The best time to treat the parasite is when it is in the THERONT phase. The outer shell from the Trophant phase opens and hundreds of parasites are released into the water. From this point the parasite has approximately 48 hours before it has to find a host to remain alive. This time is definitely the optimal time to use medication to kill the parasite. It is vulnerable since it does not have any protective outer layer.

Understanding how the parasite lives really does help eradicate it. If you raise the temperature in the tank the life cycle will progress much more rapidly. Colder water means the parasite will slowly move through each of the stages. Keep in mind not to raise temperatures to an unsafe degree. Know your fish and plants to make sure you don't use a remedy that is both harmful to the parasite and your aquarium pets.

Heat is ideally the best method for getting rid of ich but it is merely a mild strategy and not always so effective on severe outbreaks. Heating the aquarium gradually and performing frequent, partial water changes can benefit the situation greatly but may not always be 100% effective. This method will help to control the circumstances but is not dependable as the primary course of action.

Aquarium salt is the best method for eliminating ich because of the lack of dangerous chemicals used and most bacteria and parasites cannot survive in saline. Natural cures, if there are available, are always the best solution to any aquatic illness. Aquarium salt is always available in aquatic retail stores but a cheaper solution would be to go with natural sea salt which can be purchased in your regular grocery store. The key is to use salt that contains no iodine or calcium silicate because those additives can be quite harmful to the fish. Salt or sodium chloride, will not affect water levels and will control a number of diseases including ich. The only problem with this cure-all aquarium additive is that not all

plant and animal species can handle a whole lot of salinity. Loaches, catfish, snails and various plants are not able to tolerate the addition of high salt levels in the tank. The recommended dosage is 1 tablespoon for every 5 gallons of water. Gradually raise the water temperature to as much as 82°F to speed up the parasitic lifecycle. The reason for this is to get to the theront phase where the parasite is most vulnerable, so that it may be killed by the salt quicker. If you catch the ich early, this method should work before there are any casualties.

Copper is another method used when treating ich. It is not a chemical that is safe for all aquarium plants and animals but it can be a highly effective treatment if used properly. Copper is often used as a prophylactic or preventative measure against bacteria and parasites. This is not a good thing because bacteria and parasites have the ability to develop immunity to the effects of chemicals like copper. Upon spotting the ich parasite on fish, copper should be used as directed to cure disease. Once the treatment process is complete the chemicals should be flushed from the tank over the course of several water changes and with the help of a charcoal filter. When using copper as a cure you will often need to add antibiotics to the tank to separately treat infections that come with ich.

Malachite green is another chemical that has proved to be highly effective against ich. Named for its color similarity to the mineral malachite, this substance is one to be cautious of for its toxic qualities. When absorbed into a fish's tissue this stuff can be carcinogenic which means it is cancer causing and also mutagenic which means it causes mutations in reproduction. Malachite green cannot be used on food fish and is toxic to eggs, fry, and some varieties of tetras, catfish, elephant noses, loaches and small marine fish. It may also damage your biological filter and will likely stain aquarium decorations and silicone sealant. Malachite Green is light sensitive, and you will be advised to keep your aquarium lights off during treatment to prevent the chemical from oxidizing (source: cichlidforum, available on 26th April 2008). I am not quite sure why it is used so widely in the aquarium industry, because it seems that the harmful properties far outweigh the benefits.

There are many medications available on the market and many if they contain the same ingredients but use a different trade name, it is well worth the effort finding out which medications contain which main ingredients. Another common problem is that we ask advice on international forums and brand names in some countries are not sold in our Country but if we know the main ingredient then we can soon track down the right medication for our fish.

Below is an article that describes the main medications used in the fish keeping hobby

Aquarium medications

For aquarists who have invested a considerable amount of money and time in establishing an aquarium, there is nothing more daunting than seeing their fish become ill and possibly dying. Anyone who has maintains an aquarium either for work or for pleasure should take the trouble to learn what is involved in maintaining their fish's general health, how to recognize the common diseases that can affect the fish, and more importantly, have on hand the relevant aquarium medications to apply to the water to nurse their cares back to perfect health. The first thing to understand is that healthy water means healthy fish.

One of the major causes of fish becoming ill is if they are kept in overcrowded conditions where they can develop a condition known as fish stress. This problem can also develop as a result of water in the tank being less than ideal for the health of the fish. Not necessarily fatal, fish stress will cause a gradual deterioration in the health of the fish, and cause them to be more vulnerable to diseases. Therefore aquarists must be aware of the factors that can cause aquarium fish to become stressed and do the maximum to treat it, as quickly and efficiently as possible. There are many aquarium fish stress relievers on the market that will do the job.

The corner stone in building a medicine kit for any aquarium should be a water test kit. General health problems in the aquarium are usually caused by the water, and any irregularities in chemical or biological content can be detected and analyzed using a test kit or test kits. The tests that need to be carried out are for excessive levels of ammonia, nitrates, pH, GH and KH.

It is also very useful to have a dechlorinator around to ensure that the water is free of chlorine in any form. Rock salt should be included in your medicine kit as it acts as a preventative from all forms of parasitical bacteria attacking the fish

Aquarium medications that should be in your kit should include the following:

Potassium permanganate – useful for general disinfecting

Methylene blue – will help in reversing brown blood disease

Formalin and malachite green - will destroy many of the common parasites found in an aquarium such as Rid Ich or Quick cure)

Praziquantel – used to eradicate flukes in the water

Anti-Parasite Medicated Fish Food – Useful in the treatment of flagellates, trematodes, hexamita (hole-in-head), cestodes, spironucleus, intestinal worms, nematodes, and tapeworms.

Tricide Neo or Neocide 3 dip – an antibiotic that provides stronger than usual resistance to bacteria.

Kanamycin, Maracyn1&2 or Jungle Fungus Cure – Any of these antibiotics that can be introduced into the aquarium water are very important additions to an aquarium medicine kit.

Clove oil or Fiquel (MS-222) - These chemicals are useful to have around for sedating the fish, either individually or collectively.

These examples of aquarium medications represent only a very small percentage of the general choices that should be used in first aid of fish in an aquarium. For someone who wants to take the treatment levels a stage or two further will need to study about specific diseases liable to affect the varieties of fish kept in the aquarium. Information on specific aquarium fish diseases and on the ideal medications to be used in treatment should be readily available online. Those aquarists who want to be more involved in diagnosing illnesses within their aquarium tank might consider acquiring a microscope as well as slides and cover slips, all readily available online.

For first aid treatment to individual fish that may have become injured it is a very good idea to make sure that the following items are within easy reach.

3% hydrogen

Peroxide,

Iodine,

Triple antibiotic cream,

Gauze,

A soft toothbrush – useful for cleaning fin rot, ulcers or wounds

Tweezers – for removing gravel that could get stuck in the fish's mouth

If the need arises to treat diseased goldfish separately it may be a good idea to prepare a simple quarantine tank as a vital addition to an aquarium medicine kit.

A quarantine tank allows the habits of the diseased fish to be studied without running the risk of any other fish in the main tank becoming infected. If an aquarist deals with fish that are expensive and rare, the cost of keeping a quarantine tank in reserve will far outweigh that of having to replace all of the fish in the tanks if the disease is contagious and they all die.

Obviously setting an ancillary quarantine tank will cost considerably less than a main tank. It will be smaller in size and require basic accessories, such as simple mechanical and biological filtering, heating and thermometers to test water temperature.

Taking care of the welfare and the health of the fish in their care is part of the responsibility of an aquarist. If done properly it can bring a lot of satisfaction. The aquarium operator enjoys the back up of the internet in maintaining their fish in healthy condition. Either by accessing the wealth of information available or purchasing the bulk of the medications and specialist materials required.

Quarantining your fish

It is always a good idea to set up a quarantine tank for any new arrivals. A plain tank with a sponge filter and heater is ideal and it can save contaminating a whole display tank with infected fish. If your new fish are placed in the “Q” tank for 2-3 weeks they can be observed for any symptoms of illness and treated separately from your main stock. Not only does this protect your display tank but the smaller water volume of the “Q” tank means that you will need less medication; this also means that you will be spending less money. I normally float a sponge from an air driven sponge filter in the top of my display tank for a week before adding it to the “Q” tank, this then saves the hassle of having to cycle the tank prior to use.

8. Fish Tank Maintenance

Once your tank is running and stocked up with fish the worst thing you can do is neglect the maintenance of the tank. The tank will start to look grubby, the fish will definitely start suffering as the water quality drops and your equipment will start to run below their maximum efficiency.

You have probably spent a lot of money starting up your tank so it is well worthwhile to keep it in top condition, the fish will be happy, you will be happy and the tank will be a pleasure to look at.

It is better to work out a schedule of when tasks need performing and before long they will become second nature to you, in the first few weeks you may forget some tasks but if you compile a written task sheet then each job can be ticked off as it is completed. Some of the tasks need doing on a daily basis, others weekly and some may even be every couple of months. Every aquarium is different so there are no set rules but you will soon realise how much cleaning, size of water changes are required to keep your tank healthy. I can provide a brief guide of the tasks involved but adapt the guide to suit your tank.

The daily tasks should take no more than 10-20 minutes and some of the larger monthly tasks may take up to an hour but if you are to keep the tank successfully you will need to adhere to your schedule.

Daily tasks

Every day your fish will need a supply of food. Don't be tempted to over feed your fish, it is better to provide a couple of small meals through the day rather than one large one where a lot of the food will get wasted and will decay in your tank. Only feed what the fish can eat in 5 minutes, if you have snails in the tank they will act as a clean up crew but if you spot a lot of leftover food siphon it out after the 5 minutes feeding time.

At aqua-fish.net there are articles covering this topic:

*See the article called **Food and feeding aquarium fish** in the chapters above, please.*

Vitamins and fish feeding principles

Introduction

Every aquarist is proud if fish in his aquarium are or natural colours and if they are healthy. Fish's good health heavily depends on diet, since your pets need

something similar what they could find in nature. Various fish subsist on various food including worms, maggots, algae, plants or fruits. Some are carnivores, some are omnivores.

Maybe you didn't know what food (besides common foods like flakes, granules or brine shrimp) you can feed your fish with:

Daphnia, Bloodworms, Basil (*Ocimum basilicum*), Angelica root (*Archangelica officinalis*), Capsicum, Carrot, Wheat, Spinach, Nettle, Borage (*Borago officinalis*), Spirulina, Seaweed, Glycine soja.

Daphnia and bloodworms are easily consumable and very rich fish food. Both, Basil and Angelica root help your fish against stress. Capsicum and Carrot stimulate digestion and are full of vitamins. Carotene keeps the fish coloured. Wheat contains carbonhydrates. Spinach and Nettles offers a lot of minerals and trace elements which help them to grow naturally. Borage reinforces saddles and also affects against stress. Spirulina and seaweeds contain amino acids, vitamins, minerals and trace elements. Lastly, Glycine soja helps to keep fish's immunity fine.

Habits

Since various fish use to receive their food at different water levels, you should use at least 2 kinds of food. However, this depends on your aquarium. For example, Plecos use to eat at bottom levels, but if you let plants like *Vallisneria Gigantea* grow, you'll notice that Plecos like to swim to the top levels where they remain on the plants until everything's eaten. Generally, every fish should get it's food no matter if it's hidden behind the rocks or if it's waiting for food all day long like Guppies or Platy.

Basically, fish with flat back, upcasted mouth and spinal fin moved rearward use like flakes the most. Fish with crownedback and belly, mouth orientated forward like granules which are „placed“ on the glass. Such fish tend to accept food which don't fall down to the bottom.

The last kind of food is that which falls down. Plecos and Cories love it. Generally, all fish with flat belly and mouth orientated downward can be added to this group.

Every food must contain enough vitamins. The most required vitamins are: A, B1, B2, B5, B6, B12, C, D3, E, H, K. Besides vitamins, food of good quality must contain proteins, carbonhydrates, oils, minerals, trace elements.

Feeding

Feed your fish at least twice a day. Don't overfeed and try to lay the food equally, so every fish will get it's piece. In my experience, change the food on a regular basis. Fish are like humans; They don't like to eat the same food every day, 7 days a week, 365 days a year.

Feeding time is also important due to tracking possible ill or unhappy fish. If there are many territorial fish in your tank, small ones will have troubles with obtaining enough food. Check all tankmates once a week, so you will avoid diseases and similar problems.

When you buy a new kind of food, fish don't eat it immediatelly. Give them enough time until they get familiar to it and will accept it without any problems. Sometimes, it's needed to wait 1 or 2 days, sometimes they accept new food after 7 or 14 days, and sometimes they will not eat it at all.

Since you can't avoid fallen food at the bottom, it's recommended to keep some Plecos. They will gladly accept it and their menu will vary naturally.

Vitamins

A – Stimulates eyesight and growth, protects skin and helps breeding.

B1 – Supports nerves. Supplies the brain and nerves with sugar. Transforms carbonhydrates to energy.

B2 – Supports muscles and protects skin.

B5 – Very important for enzymes.

B6 – Important for the nerve system.

B12 – Required for digest bodies and for proper production of hemoglobin.

Hemoglobin is required for oxygen transport.

C – Helps the immune system and creation of skeleton.

D3 – Regulates acceptance of Calcium and Phosphorus, so it's very important for creation of skeleton.

E – Stimulates creation of reproduction hormones, stabilizes other vitamins and acids contained in food.

H – Represents the growth factor.

K – Helps blood coagulation.

Always do a head count on your fish in the morning when you first approach the tank, the inevitable death happens sometimes whatever we do to keep our tank healthy and the bodies of the dead fish if left in the water will start to decay and upset the water parameters. Any dead bodies must be removed immediately.

Always check the temperature of the tank if you are keeping tropical fish, heaters can fail and if the thermometer is not checked you will not realise that there is a rise or drop in the temperature.

Make sure that the filter is running properly and isn't clogged. If the water flow from the filter is reduced you will need to clean out the sponges in old tank water as soon as possible.

Check the water level in your tank, there may be evaporation due to the heat top up the tank as required with conditioned water.

Weekly tasks

The main task of the week has to be a water change, this is very important as it is the best way to remove the nitrates from the water and keep the tank water fresh. Most tanks will require 20-25% of the water changed on a weekly basis, if your nitrates stay at the same level you will know that you are changing enough, if they increase over the weeks then it is time to start doing larger water changes.

It is simply a matter of siphoning out the required amount of water and then topping up with fresh water that has been treated with a suitable water conditioner. Before you add the fresh water back to the tank make sure that the temperature and the pH are the same as the water that you have just taken out.

Always make sure that as the water level drops when you are siphoning out that the heater stays underwater, if it is exposed to air there is a very strong chance that the glass casing will break.

Run an algae magnet over the tank glass as there will be a fine coating of algae over it and if this is left it will build up and your tank will turn green.

At aqua-fish.net there are articles covering this topic:

Aquarium glass cleaner

Anyone involved in any way in keeping fish, is well aware of the dilemma faced every few months as the amount of foreign bodies that fish and plants generate begins to mount up. The dilemma is whether to empty the tank completely, place the fish in a quarantine tank, and give the main tank a thorough cleaning inside

and out. This seems like the easy way, yet an experienced aquarist will do just about everything possible to avoid doing it. Why? Not because they are lazy, but because if they do so they will more or less lose all the colonies of beneficial bacteria that has accumulated in the tank water. Another reason is that for the fish themselves, it is traumatic and cause fairly significant health problems, no matter the short their stay in their temporary accommodation.

So the dedicated aquarium operator or owner every now and then, as part of an annual maintenance program, will roll up their sleeves and give the aquarium a thorough cleaning both outside and inside. Cleaning the tank on the outside, as you can imagine, is fairly straightforward. When it comes to cleaning the lid of the tank, a little extra care is required to make sure that no potentially harmful chemicals in the detergent or chlorine from the tap water used in the cleaning remains on the surface. Sounds fairly straightforward? It is.

It's only when you begin to start cleaning the inside of the tank that the complications can begin. To be honest, over the last few years, cleaning the inside of an aquarium has become much less of a nightmare than it once was. The many companies who design and produce equipment for aquarium cleaning have come up with some fairly innovative ideas to make the job cleaner, drier and quicker for the person assigned to the task of being aquarium glass cleaner and less traumatic for the fish themselves.

Having got that important piece of information out of the way, the next step is to bring in the specialist tools to clean the interior sides of the tank, and there are a few.

The first are specialist pads or scrapers used to remove algae from the sides of the tank. In any action involved in cleaning the interior sides of the tank you basically have three options.

Use a long handled brush. Might save you from getting too wet but is not too effective.

Use a magnetized pad. This is becoming the most popular option as it is the most user friendly type of aquarium glass cleaner. That applies only on the condition that the glass does not need to be scrubbed as it is very difficult to build up any kind of friction using magnetized cleaning pads. One side of the pad is placed on the exterior of the glass and the other on the interior. The pad is then moved around, controlled from the outside while the cleaning is done from the inside. To get the best use out of magnetic cleaning pads, the tank should never be allowed to get too dirty. On the upside these pads are really easy to use, so there is no reason not to clean the inside of the tank much more frequently.

What once was the most common method of cleaning the interior sides of an aquarium was to stand on a chair or on a ladder, roll up your sleeves to the very

top and start to scrub! This must have been very traumatic for the fish, and not so much less for the aquarium glass cleaner. For this reason aquarium interior cleaning was carried out at intervals too far apart until the situation in the tank became unhealthy and no one on the outside could see if the fish were dead or alive.

For this reason magnetic pad cleaners have become increasingly popular in the aquarium world and have become the first choice for enthusiasts who want to provide a pleasant environment for their fish and an easier life for themselves.

A few examples of the many types of algae “float” magnet pads available online are listed below:

The Algae Free Float Magnet: Algae Free are a company who manufacture a wide range of different sized magnet pads, designed to suit different glass thicknesses. Known for their durability, the interior pad is surfaced with Velcro to remove some of the more persistent surface pests.

Magnavore Cleaning Magnet: Based on a similar design, the Magnavore is more suited to smaller aquariums with thinner glass.

These are just a couple of example of the many specialist cleaning magnets that can be bought online and have made aquarium glass cleaning a simpler task.

See the article named **Fish Tank Cleaning** that's in the chapters above, please.

On a weekly basis, the water must be tested for quality. There are several parameters that need to be checked to show you that the tank water is safe for your fishes. The main ones are ammonia, nitrite, and nitrate. With a cycled tank the ammonia and nitrite levels should never be above 0, nitrate levels may fluctuate but as mentioned earlier, regular water changes will keep these to a safe level. The pH should also be monitored with a suitable test as well as the hardness of the water. The two following articles will explain this in more detail.

*Please, check the article called **Ammonia test kit** which is placed in the chapters above.*

Water Chemistry: What about it and why should we worry?

The chemistry of the water in a fish tank is very important. A fish tank is a closed environment, where everything that goes into it affects the chemistry in one way or another.

Imagine you are sealed into a room with no toilet, no windows and fed only when the keeper saw fit. What would the air be like in a week? This is essentially what happens in a fish tank. The fish are trapped in an environment that you control. They get fed when you give them food, the water gets changed when you remember to do it. Filters help a lot, by controlling the levels of toxins, removing large bits of debris and un-eaten food and aerating the water, either by disturbing the surface or by adding air internally in the filter. You can add air stones, plants and ornaments, but the fish are still trapped. The décor makes it a little more comfortable for the fish, but they are still trapped.

So, where does the water chemistry come into the frame? Without knowing what the conditions are inside the tank, you cannot tell whether the fish are comfortable or not. If you just wait till something happens, it's usually too late, and you lose the fish. Testing the water is essential for healthy fish. Knowing what to look for is also essential, but this is something that you learn as time goes by.

Also, some fish can only tolerate certain conditions. If you don't know what your water chemistry is, how do you know if they are going to survive?

What do we test for?

Ammonia: The levels of ammonia in the tank are critical. As little as 1PPM will kill.

Nitrite: Although not as toxic as ammonia, it is still lethal in sufficient quantities.

Nitrate: This is not nearly as dangerous to the fish and is tested to find out just how effective the filtration is and when we need to make water changes. Nitrates are normally present in a cycled tank, and should be kept at around 10PPM. This level is perfectly harmless. If the level rises to 50PPM you may start to see signs of distress and the fish's immune system is weakened, leaving them more susceptible to disease. When it gets as high as 100PPM, the fish will be severely stressed and will start to show signs of infections and other problems.

pH: This is a term used for acidity of alkalinity of water. Most fish can survive in a wide range of pH, but some, especially African Cichlids need a much more specific pH.

GH: Is the general hardness of the water in your domestic supply and the tank. It refers mainly to the amount of calcium and magnesium in the water.

KH: This is the term used for carbonates and bi-carbonates, and this refers to the "Buffering Ability" of the water, as in how easy or difficult it is to change the Ph value of the water.

How do I test the water?

Test kits come in various forms, each type covers different aspects and the accuracy of the kit depends very much on the cost. Below are descriptions of two of the most popular.

Test Strips: Simple and effective, but by no means accurate. These can be used to test the pH, Gh, Kh, Nitrites and Nitrates in the water. They are only good as a guide, not being accurate enough to identify problems, but good enough to suggest that there may be something going wrong. I use them a lot on my tanks, simply because they are relatively cheap and as all my tanks are stable, it's just a way of being sure.

Liquid test kits: Much more accurate, but more difficult to use. These will give much more precise readings on individual toxins, such as ammonia and nitrites. These should be used whenever you suspect that you have a problem, or when starting a tank, during the nitrogen cycle. They are more expensive, so one tends to be careful with the use of them.

Do I need to change any of these?

Any signs of ammonia is dangerous and should be addressed immediately by water changes and reducing the load on the water, by removing fish etc., find the cause of the increase. This could be due to adding new fish, blocked filter, overstocking etc. Mostly the cause is the filter, so checking your filter and cleaning it if necessary in old tank water may well rectify the problem.

Nitrites are similar, and should be addressed in the same manner as above.

Nitrates need to be held below 20 to be sure that your fish are healthy. This is done by regular water changes according to the readings. If your tank is overstocked, then more water changes will be necessary, if you have plants in the tank, this might reduce the need for changes a little, but they will still need to be done.

pH is something that we are pretty well stuck with, but it helps to know just what pH your water system has. It can be altered, but is very difficult to do, and has to be continually checked and re-adjusted during water changes. If possible, it's best left alone.

GH and KH can be altered relatively easily by proprietary products, distilled water, rain water and the like. Personally, I have not found a need for this yet!

There is no fixed schedule for cleaning your filters, as part of your daily tasks they should always be checked for blockages but try to rinse out the sponges at least once a month

with old tank water. Every 6 months it is a good idea to check the piping on external canister filters to see if they need cleaning or replacing. With these filters it is also important to keep the impellor clean so that it can run properly.

Once a month it is wise to get a damp cloth and wipe the light tubes, dust and sediment will settle on them dimming their output. Keeping them clean will make them brighter.

9. Which fish for which Biotope?

As mentioned in an earlier chapter many fish keepers try to re-create a particular part of the world in their fish tank, they will design the hard décor and planting arrangements according to which waterway of the world they are creating. This will also include which fish species they will actually add to the tank after all there is no point making a Malawi biotope and adding South American cichlids to it, not only would the water parameters be wrong for the fish but it would make nonsense of creating the biotope in the first place. There are many biotopes that can be created so hopefully this chapter will give you some guidance as to which fish are suitable for which biotope.

As we work through each biotope it should become apparent how matching the fish species to the correct biotope works, it is not too difficult to do the hardest part may be trying to track down a supplier of the more obscure species. I will try to give examples of the easier species to locate; the more obscure species may be available in certain areas of the world but not always.

Southeast Asian River

Recommended size: 100 l (21.99 ga)

Description:

South East Asia covers generally mainland Asia plus the islands of Sumatra, Borneo and Java. In earths long past these were all joined together with a large river system running through them all. This area is rainforest where the land water will move down to lots of tributaries. In the rivers there is virtually no current, a very slow moving environment with lots of dense and decaying vegetation. Bamboos and ferns are above and below the waterline, the natural substrate and rocks being a deep red coloration as there is a strong concentration of Iron in these waters but the overall mineral content is very low.

Due to the rotting vegetable matter the water is acidic; a pH of 6.0-6.5 should be maintained in your biotope. Hardness should be between 2-8 DH and the water temp in this area is on average between 26-29°C, once again these should be duplicated in the biotope.

Salt can also be present in some areas, admittedly in low concentrations, but if added to the tank in small quantities it will be beneficial to the fish without harming the plants. As the natural area comprises of various river tributaries, there are many places where the depth of the water can be very shallow, this means that when selecting your tank depth is not a key issue.

Setting up the Tank

For the purposes of this biotope length in the tank is more crucial than the depth. For a pleasing visual display and to recreate the shallow river scene required, I would suggest a tank that is 48 inches in length, 12 inches width, and 15 inches high. This will give the illusion of a long shallow river, but if space is at a minimum then a 36" tank will suffice but remember that some of the fish that will be included in this set up will grow to quite a large size. The substrate needs to replicate the deep Iron red of the natural habitat so the obvious choice there is some nice rich red laterite, this will also be of great benefit to the plant life. On top of this add some fine red gravel or sand, even separating areas of just sand or gravel will enhance the look. Another option is to use the Seachem Fluorite; this is red clay gravel that also acts as a great plant growing medium. Add some bogwood to replicate tree roots, not too much though as this can ruin the effect. Scatter some small pebbles and rocks in a random fashion but make sure they are inert as the water is acidic and they could react with it if not. The substrate should be slightly higher at the back of the tank so as to give the impression of a sloping bank plus any detritus will fall to the front of the tank making it easier to siphon out. This is all the hard scaping that is required, now we need to look at the plants to be added.

Plants for the biotope

Suggested plants for this set up include *Cryptocoryne Wendii*, *Cryptocoryne Nevilli*, and *Hygrophila Polysperma*. Some keepers will add *Vallisneria* to this set up to give a good mid ground effect with the long strands of leaves floating upwards to the water surface but I find these tend to grow better in neutral to slightly alkaline conditions. This doesn't mean that they will not grow in an acidic environment so try a couple of plants if you wish just to see how they get on.

With the crypts it might be better to add them after the tank has been running for 2-3 months as they do not like new tank set ups. They will often suffer from crypt meltdown where all of the leaves will die off but these should re grow if left to their own devices.

Onion plants will also be suitable but remember to leave the crown of the bulb showing above the substrate. Bamboo plants are also a good choice for this

biotope and if the tank is open topped then allowing some shoots to grow above the water surface can make a very good effect.

Suitable fish

Most loaches, Barbs, Danios, Red tail sharks, Bala sharks, and small Asian catfish are more than suitable for this biotope. Always check that the size of the tank is right to suit the adult size of the fish you are adding or be prepared to move the adults to a larger tank in the future. Bala sharks and clown loaches will definitely out grow a three or four foot tank so research before buying. I have seen this biotope set up with just a shoal of green tiger barbs and the effect was stunning.

Lighting for the tank

Add sufficient lighting to encourage the plant growth but do not add excessive lighting. This will lessen the natural effect you are trying to create, if necessary it might be advisable to add a CO₂ system to make up for the lighting shortfall but let the plants settle in before deciding whether to pay out for this additional equipment.

Filtration

As with any tank set up the filtration must be able to cope with the livestock that is being added but what you do not want is a fast current flowing through the tank, this will also spoil the overall effect you are trying to create. If you are running an external filter then add a spray bar to disperse the current from the outlet pipe, it may be even necessary to have it pointing towards the back glass to reduce the current even further. If you are using an internal filter it is even possible to buy spray bars for some of the more popular models. Failing that adding a wide outlet nozzle will dampen the water flow.

It may be necessary to add extra oxygen via an air line due to the lack of current but if this is the case a steady stream of bubbles sited in the corner of the tank should not be too conspicuous.



As you can see from the above article, there is very little water movement in this biotope. The water is very soft and acidic, with a higher temperature range than some of the other tank set ups. This is ideal for some species of loaches, sharks and barbs. The lighting is moderate which loaches relish and the barbs and danios make excellent middle swimmers.

Bala sharks and clown loaches are ideal for this set up but they do grow quite large and will need a tank large enough to allow for this.

Barbs are ideal but need to be kept in groups to reduce the chances of fin nipping the other species of fish.

Danios are very peaceful and will swim with each other all day long.

Indian/Burmese River

Recommended size: 100 l (21.99 ga)

Description:

India is a well populated country but there are still many areas that have maintained their original habitat. The river areas are included in this and the same habitat extends into the neighboring country of Burma. The most well known river has to be the Ganges, but there are also other large rivers running through India like the Krishna, Brahmaputra, and the river Chittar. There are variations in the different habitats from the mangroves of Sunderbans to small streams that run through the Himalayan foothills.

There are many native species of fish in this area with a few being endemic. With India being such a heavily populated country there are areas of the river ways that are now starting to face problems with pollution but this is being recognized by the Indian Government who are trying to install plans to clean up the main rivers to prevent diseases being spread amongst the population as well as creating a much cleaner habitat for the hundreds of species of fish that inhabit the waters.

Setting up the tank

The suggested tank size for this project should be at least 100L but as with any aquarium try to use the largest that you can afford. The water parameters that you are aiming for are as follows:-

pH 7.0-7.5
6-12 DH
21-24 °C

When adding your substrate use fine gravel or sand on top of a planting medium as this biotope needs to be heavily planted to get the full effect. Slope the substrate so that it is deepest at the rear of the tank, not only will this help to keep the waste at the front of the tank, but it will also give the impression of a river bank at the rear of the tank. Rocks and driftwood should be added for hiding places and shelter, also they will provide some shady areas for the fish trying to have a rest from the lighting. Add these in a random fashion to make it look more natural rather than a set out design. As this will be heavily planted, bright lighting will need to be used and possibly the addition of a CO₂ system should also prove to be beneficial.

Plants for the biotope

The plants suggested for this biotope are high lighting plants so the best lighting you can afford is a must. For the background a mixture of Rotala and Aponogeton are ideal. These can grow up to 18 inches so keep them to the rear of the tank, at the most plant them mid tank. Mid ground I would suggest Ceratopteris, this is also known as Indian fern and in some tanks is used as a floating plant but in this case we do not want to block out any of the light.

Foreground I would suggest a mixture of Eleocharis and Blyxa Japonica. Eleocharis is also known as hair grass and if given the right conditions will propagate itself to give a nice covering over the substrate. The Blyxa should be planted foreground in random clumps to give a bit of contrast. Iron supplements are advised with these plants, this can be given easily with the suitable liquid feeds

Recommended livestock

There are quite a lot of species of fish to choose from for this biotope. Danios, rosy barbs, glass catfish, gouramis, spiny eels. Climbing perches, loaches, Bala and silver sharks can also be added. Plus there are many more that can be used. If adding gouramis try to avoid adding two males into the tank, they will become territorial and fight with each other.

If adding climbing perches then a tight fitting lid is a must, these fish can survive out of water and can escape from your tank. In their natural habitat it has even been known for them to climb small trees and shrubs.



A brightly illuminated set up with heavy planting, ideal for most species of small fish like the danios and barbs. If you plan on keeping Gouramis in this set up, try not to add too many males together as they will end up fighting for their own territories.

Glass catfish prefer to be kept in small groups and are very sensitive to any change in water parameters.

Rosy barbs look superb in this biotope along with the friendly danios.

Northern Madagascan

Recommended size: 100 l (21.99 ga)

Description:

Madagascar is a large island in the Indian Ocean off the south eastern coast of Africa. This island hosts many plant, fish and animal species that are purely endemic to it. It was originally joined to Africa but split away 160 million years ago. A lot of the current habitats are under threat as more and more of the natural landscape is being converted to paddy fields for the cultivation of rice. As deforestation is occurring at a fast pace erosion is starting to increase along with the introduction of exotic fish species like the snakeheads and mosquito fish, the endemic species of fish are starting to decline rapidly. Some of the species are even thought to be extinct as no reported sightings have been made for several years.

Tilapias were introduced to the rivers and streams as a food source but due to their aggressive nature they have displaced many of the native cichlids.

Setting up the biotope

The recommended size tank for this biotope is at least 100 L (22.0 gallons). On Madagascar the water is hard compared to other regions, 8-19 DH with a pH of 7.0-8.0.

Temperatures should be set between 24-29°C depending on the livestock you are adding. Due to the large temperature range always research the fish you are going to add.

The rivers and streams on Madagascar have sandy substrate with earth banks and lots of plant life so the substrate should be fine silica sand or fine gravel.

Lighting should be bright to give the desired effect but a steady current in the water is needed so it is advisable to dampen down the water flow on the filters with spray bars if possible.

Suggested plants for the biotope

Background to middle planting can be achieved with Aponogeton Bolvinianus, this can grow quite tall, up to 30" in its own habitat but in an aquarium it rarely exceeds 20 ".

Bacopa Madagascariensis also makes a great plant for the middle of the tank, but reserve a place in the middle for a specimen plant like Aponogeton Madagascariensis commonly known as the Lace plant. This is getting hard to find in its own habitat but they are available to buy, the shortage does reflect on a higher price though.

For the front of the tank add some clumps of Blyxa Auberti mixed between random pieces of driftwood.

Another good specimen plant is Cyperus Alternifolious; also know as the umbrella plant. This is closely related to papyrus and can grow quite tall.

Suggested species of fish

Bedotia Geayi is a rainbow fish that is endemic to Madagascar, commonly known as the red tailed silverside. Adult size of this fish is 3.5 inches and it prefers temperatures around 24°C.

Cichlids like the Paretroplus family can be added, there are a few species of these to use but these may need to be ordered from a specialist supplier.

Killifish are a must with their beautiful colorations, lots of variations to choose

from and easily available to purchase.

Freshwater gobies are found everywhere in Madagascar, brackish species are also to be found in the river tributaries.

If you are planning to add cichlids from other areas of the world, research them first as they may attack or even eat the smaller inhabitants of your tank.



For this Madagascan biotope it has to include its own endemic species of rainbow fish. It is commonly known as the red tailed silverside and displays extraordinary colouration when given the right set up. Killifish should also be included as they are abundant in this area and everyone will have its own form of colouration. For a bit of contrast and a good substrate delver, the freshwater gobies are the perfect choice. They all have their own little characteristics and will appeal to anyone who owns them.

South American Clearwater System

Recommended size: 100 l (21.99 ga)

Description:

Clear or blue water streams are the small transparent rivers that drain off the surplus water from the Guyana highlands and the rocky highlands of Brazil. The currents in these streams can vary from place to place, fast flowing currents in one area right down to slow moving waters further along. Two examples of these rivers are the Rio Xingu and the Rio Tocantins. As the streams head towards the

sea the water is cascaded over a rocky floor, this in turn acts as a filter to remove any impurities that may be found present.

The pH of the water is found at 6.9 - 7.3 and the hardness of the water is soft to medium hardness (5 – 12 DH), temperature is normally within 24-28°C. The river beds are covered in fine white sand with small to medium sized stones scattered about and the banks are full of vegetation from the rain forest.

Setting up the tank

The recommended size tank for this biotope is 100 liters (22 gallons). To recreate the natural habitat fine white sand should be used but fine gravel is also used by some keepers. To keep the water crystal clear good filtration is a must. Bright lighting will show off this set up well alongside a good selection of plants. Medium sized stones placed on the substrate in a random fashion will give the tank a more natural look along with a couple of pieces of either driftwood or well soaked bogwood (mopani). Heavy planting to the rear will give the impression of fertile river banks and aeration to the tank will prove beneficial.

Plants for the tank

A general selection of plants can be used from the following species, sword plants, ceratophyllum, cabomba, lemma, limnobium, Vallisneria.

Keep the tall plants to the rear of the tank and use some of the miniature swords towards the middle ground and fore ground.

Species of fish for the tank

The armoured catfish make a good addition especially the bristle nose ancistrus as they will do a great job of keeping the tank free from algae, if you wish to spend a few extra pennies on a rarer catfish then the zebra plec is also ideal. The zebra plec is now protected and cannot be imported anymore but there are now quite a few breeders that have successfully raised fry, be prepared to pay a good price for them though.

Corydoras will also do well in this biotope, cleaning the substrate on a daily basis scavenging for food. If you are adding Corydoras it might be more advisable to use a sand substrate rather than fine gravel as their barbells can easily be damaged.

Dwarf pike cichlids should be chosen rather than the larger species as they can become aggressive and very territorial, the planting will provide some hiding places for the more nervous inhabitants but limit the numbers of these.

If using the smaller tank then many of the South American dwarf cichlids should feel well at home with this set up, the secret to keeping this biotope successful is to maintain a water flow with good filtration and regular water changes are a must.



This is one of my favourite biotopes as it is ideal for two of my favourite fish. The tank is well planted so algae could be a problem on the tank glass, however by adding the ancistrus catfish (bristle nose plec) this would not be a problem. They are wonderful as tank cleaners and look good in this tank as well.

My other favourite species of fish are the Corydoras, they are very friendly and if kept in small groups will play all day long with each other.

For the middle swimmers I would go for the South American dwarf cichlids, they are very colourful and will feel right at home with this set up. It is best to keep one male with several females.

Several of the tetras are ideal species as well, in particular cardinal tetras and glowlight tetras.

West/Central African River

Recommended size: 100 l (21.99 ga)

Description:

West and central Africa are full of rivers. There are many rivers that we have all heard of like the River Niger, River Gamba, and of course the River Congo (this was formerly known as the river Zaire).

The River Congo is the largest river in Western Central Africa reaching a length of 2,922 miles. There is only the Nile that is larger than this in Africa. It flows through the second largest area of rain forest in the world; the largest being the Amazonian rain forest. Its source is the highlands of the East African Rift and from the great lakes like Tanganyika.

As with most of the African rivers, the water current varies from region to region providing different habitats for various species of fish. The pH of the water ranges from 6.9 up to 7.2 so a biotope with a neutral pH (7.0) should be ideal. Water hardness should be soft to medium (3-8DH) and the temperature needs to be set between 24-27 deg C.

Setting up the tank

Tank sizes of 100 liters (22 gallons) are ideal; but always go for the largest you can afford. Fine gravel or sand should be used for the substrate and provide plenty of hiding places with wood. Strong lighting is not required for this tank, if possible add some floating plants to provide shady areas.

Water movement can be provided with the filtration but this needs to be a gentle flow.

Plants for the tank

African water fern should be used for the background, this needs to be attached to the wood, do not place the roots in the substrate. For the middle ground Anubias can be attached to the wood in the tank, as with the water fern do not place the roots in the substrate.

Dotted around the back ground add a few Vallisneria, I tend to prefer the Spiralis Vallisneria as it creates more of a feature but the species choice is yours. Eleocharis (hair grass) looks great at the front of the tank as long as it is not over planted; keep some open areas for the natural look.

Suggested stocking

There are quite large ranges of fish to choose from which will feel at home in this biotope quite easily. African tetras should be the first consideration. These include the red eye characins and the Congo tetras.

African glass catfish make for good middle swimmers and Mochocidae; these are known commonly as naked catfish. One example of these is the upside down catfish so named from its peculiar swimming habits. Butterfly cichlids and dwarf

jewel cichlids make good specimen fish or if you want to add some cichlids that will stand out, try the Zebra Haplochromis.



One of the first fish that springs to mind with this biotope is the Jewel cichlid; they are often overlooked in the aquatic stores as they do not get the chance to display their true colouration unless given the right conditions. In this biotope they colour up to a bright red and look fantastic. As the pH remains around the neutral level several of the Haplochromis species would also fit in well with the other inhabitants.

African tetras like the Congo and the red eye make ideal middle swimmers and for some specimen fish try the upside down catfish, a definite talking point.

Southern African Swamp

Recommended size: 100 l (21.99 ga)

Description:

The Okavango Delta is among the largest swamps in Africa. The waters support a variety of species and vigorous plant growth making it an ideal subject for a biotope aquarium. This delta is sometimes referred to as the Okavango Swamp and is situated in Botswana; it is also the world's largest inland delta.

At one time it was a lake which dried up 10,000 years ago resulting in a river that has no outlet to the sea. Instead the water disperses over the Kalahari Desert and the actual delta is prone to flooding on an annual basis. As there is no industry or agriculture along the River Okavango the water is extremely pure without any pollution from commerce. Reedy plants line the shores of the waterways and shallow pools. Floating grasses and lilies are found where there is little current. Banks along moving waterways drop off quickly, creating cliff-like formations with overhanging roots. Many fish seek refuge under these root overhangs and

inside caves.

The water tends to be alkaline with the pH ranging from 7.2- 7.8; hardness being soft to medium. Temperature wise it ranges from 21-24 deg C

Setting up the tank

The minimum recommended size tank is 100 liters (22gallons) but as in most cases the larger the better.

The substrate should be fine gravel or sand with hiding places added, these can be created from wood or even by using rock formations to create caves. Bright lighting should be used for most of the plants, but plants like Anubias may need to be planted in shady areas attached to the wood.

Water flow should be slow to medium but good filtration is required as the water needs to be crystal clear.

Plants for the tank

African water fern is ideal for decorating the wood in the back, it will grow quite tall when attached but can also be used as a floating plant if required. Marsilea (common name clover fern) makes a great foreground plant and given time will form a nice green carpet over the substrate.

Eleocharis (common name hair grass) will also be ideal for a background plant. It can grow up to 48 inches tall in its natural habitat but does require bright lighting. Anubias, as mentioned earlier, attached to wood will grow in lush green miniature bunches but shade it from the bright lighting.

Nymphaea (tropical lily) is the best choice for a specimen plant, easy to grow but if too many surface leaves appear these can be pruned right back to allow for more growth under the water line.

Fish for the tank

African tetras, spiny eels, barbs, Hemichromis, Syndontis, and Clarias catfish will look well at home in this biotope.

If adding the spiny eels, be careful which species you purchase as some like the tire track can grow up to 36 inches in length; there are smaller species like the Macrognathus Aculeatus that grow to 14 inches in their natural habitat, but in an aquarium will rarely grow above 8 inches.



If setup correctly this can be one of the most beautiful biotopes around. Lush vegetation act as a great backdrop to many of the brighter fish species. Congo tetras and rosy barbs stand out well in this tank along with African catfish. Spiny eels can wind their way around the décor but research which species to buy as some can get very large, particularly the *Macrogathus Aculeatus*. Hemichromis stand out well with their bright red colouration and add interest as once settled they can be avid breeders.

South-East Asian Blackwater Pool

Recommended size: 100 l (21.99 ga)

Description:

The creeks and streams that are located in the rainforest areas are often invisible from the air due to the dense coverage of vegetation but once found on foot they can be quite a size. As they are often found containing decaying vegetation on the floors of the rivers the water is very acidic and stained, this gives rise to the term Black Water.

Even with the very acidic conditions they still provide a home for many species of fish and plants. The pH will normally range from 5.5 – 6.5 and the water is extremely soft (0 – 4 DH is the normal hardness).

The temperature of the water is also higher than many other water filled areas ranging from 27 – 29 deg C.

Water movement is also very slow so this needs to be recreated in a biotope for this area.

Setting up the tank

As with most biotopes a tank of 100 liters (22 gallons) is fine, a more spectacular biotope will be created with a larger tank but the choice is yours. The substrate should be fine gravel or a clay substrate like laterite, a layer of both would definitely be beneficial to the plant life. Adding bogwood will aid keeping the water soft and acidic, plus it will provide plenty of hiding places for the fish.

As mentioned earlier, the water flow should be minimal, so slowing down the filter output will help, as will adding some peat medium to the filter to reduce the pH. Lighting does not need to be too bright, moderate lighting will be fine with the suggested plants for this biotope.

Plants for the tank

Eleocharis can be used for the foreground; this will propagate itself by means of runners, resulting in a lush, green carpet at the front of the tank. Nymphaea is a tropical lily which will provide an excellent specimen plant selection, plus it will also provide some shady areas for the fish to hide in.

Cryptocoryne Affinis should provide some lush mid ground growth; this plant will grow up to 12 inches but does not demand bright lighting. Mixed in the foreground with the Eleocharis, add some Cryptocoryne Wendtii. This is commonly known as the tiny crypt and if planted in small clumps will stand out.

Fish for the tank

Gouramis have to be the first choice for this biotope. There are many species to choose from, one in particular stands out for me. This is the Paradise Fish (Macropodus Opercularis). This species comes in a variation of colors making each fish unique and they really stand out in the right aquarium. Another Gourami I am very fond of is the Pearl Gourami (Tricogaster Leerii) with its wonderful markings. Harlequin Rasboras, Glass catfish, and any of the danios will also make suitable tank inhabitants.

Loaches will also provide some entertainment within the tank, but please be aware some of the loach species can grow to quite a large size, so be prepared to upgrade to a larger tank if needed.



Looking at this biotope it has to be the perfect choice for Gouramis. My personal favourite is the Pearl Gourami (*Tricogaster Leerii*) with its lace markings, and then we have to include the paradise fish. They are really outstanding in their colouration and markings. There are many species to choose from and they are very individual with their markings. Any of the Rasboras and danios makes great shoaling fish; they are very active and create lots of movement in the middle of the tank.

South American Blackwater Stream

Recommended size: 150 l (32.985 ga)

Description:

Black water pools, creeks and rivers originate in the rain forest areas of the world. The term "Black Water" comes from the staining process of the water as it passes through decaying vegetation and roots; discoloring the water to a bronze tea color. These waters are very acidic and soft, the hardness in some areas is negligible.

In South America one of the most famous regions is the Rio Negro which is the second largest tributary of the Amazon, at least 450 miles long by boat but impassable after that due to the number of sandbanks etc. As the tributaries flood many of the ponds and streams are formed; indeed during the flooding season as lot of the fish species will use this as their breeding season, depositing their eggs among the sunken roots and plant life. In black Water habitats the substrate is typically leaf litter over a base of clay or sand. Decaying wood and plant matter is common especially in flooded forest areas. As the floods occur many of the terrestrial plants become submerged but do not suffer any ill side effects as a result.

The pH of the water can be as low as 4.5 and the maximum is usually around 6.5. Temperature of the water is on the high side (27 – 30 deg C), and as mentioned earlier the hardness of the water will be as low as 0-4 DH. Recreating these conditions in a biotope can be difficult but not impossible.

Setting up the tank

Fine gravel or sand should be used for the substrate with pieces of bog wood either laid on the substrate or mounted horizontally to give the impression of submerged roots. For a realistic effect the lighting should be subdued and a low water flow inside the tank. Peat run inside the filtration system will help to soften the water and reduce the pH. Always test the KH on a regular basis, if it drops too low you run the risk of a pH crash. Keeping it above 3 DH will prevent this from happening.

Plants for the tank

For the background Cabomba planted in groups is ideal, this is normally used in brightly lit tanks but will grow with subdued lighting. Sword plants (Echinodorus) are perfectly happy with low lighting and are found in Black Water areas naturally. Use the larger species at the rear of the tank but plant some of the dwarf species in the fore ground to give a good effect. Vallisneria looks great for the mid to back of the tank set in groups. For a floating species, use the tropical hornwort. This plant can even be used as a bunch plant at the rear of the tank alongside the cabomba.

Fish for the tank

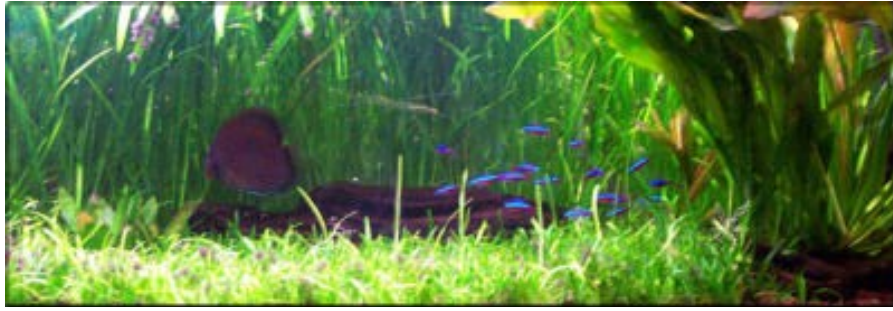
Discus and Angelfish are the two top candidates for this biotope; the golden rule is not to place both species in the tank together. Decide which of the two you wish to add as Angelfish can easily pass diseases onto the discus even though they are not affected themselves.

Corydoras make great substrate cleaners; if adding them it would be better to use a sand substrate as they can damage their barbells on gravel.

Most of the tetra species are ideal; in my own biotope I use a shoal of cardinal tetras with discus, the effect really works.

Loricarids (armoured catfish) will also do a cleaning job on the biotope; Ancistrus are well renowned as aquarium glass cleaners.

Dwarf cichlids, of which there are many to choose from, make for interesting tank viewing, especially if you are lucky enough to get a pair.



For the South American black water biotope discus will always be my top choice. They are so elegant and marked so beautifully that they are well worth investing in. If you don't fancy the extensive water changes involved with keeping discus, try Angelfish. They are relatively hardy and will soon become tame to the keeper. Never mix discus and angels together, this can lead to problems.

For the middle feeders it has to be a large shoal of cardinal tetras, they really set off your specimen fish and are full of colour. Do not be tempted to go for the cheaper option of adding neon tetras, the discus or angelfish may see these as food.

Bottom feeders can be added in the form of Corydoras. Be careful which species you purchase as the temperature of the tank is higher than a lot of set ups. I have always found that the Julii, Adofli and Sterbai seem to do best.

Southern Thailand Forest Creek

Recommended size: 150 l (32.985 ga)

Description:

There are several options for a biotope tank modeled after the conditions in these stream habitats including

- 1) sunny pools
- 2) shaded shallows
- 3) rocky rapids

Water

A roughly neutral pH would be a good starting point for such a tank. The temperature should be 26-29 °C (78-84 °F).

Tank

There are a few tank arrangement options depending on the biotope the aquarist is attempting to recreate. The substrate varies from mud to sand to scattered pebbles and river rocks, so sand to coarse gravel is suitable for use in the aquarium. In all setups, use an effective filter that keeps the water clean and crystal clear.

Plants

Cryptocoryne, Vallisneria.

Fish

Loaches, freshwater puffers, barbs, danios, and other cyprinds.



With the dense planting this biotope really gives you the chance to try your hand at keeping dwarf puffers. The vegetation breaks up the different areas so territorial arguments should not occur. If you don't fancy trying the puffers then any species of barbs will be fine but keep them in groups. The rosy barbs are definitely worth looking at. If you decide to keep danios in there the temperature will be better for them at the lower end of the suggested range.

South-East Asian Mangrove Estuary

Recommended size: 150 l (32.985 ga)

Description:

Mangrove swamps are found throughout the world where freshwater rivers come into contact with the ocean. The result is a tidal region with varying salinity and water conditions. The tides affect some of the types of fish present in the estuary, although fish termed brackish water species remain no matter what the condition.

The mangrove swamps can be found along the large river deltas, estuaries and coastal regions and due to the ever changing conditions the tree species that are able to survive are mangroves, not many other species are tolerant of these areas. The mangroves are evergreen and can cope with the salinity by producing roots that go deep into the mud to obtain what ever small amounts of oxygen are available.

The swamps are home to many amphibious species of fish like the mud skippers, this species will flee across the mud to escape from predators and they have a high level of intelligence.

Anablebs can also be found in the swamps, these fish are also known as four eyed fish. The common name comes from the fact that they possess double lobed eyes so that they can see above and below the water surface at the same time. They will leave the water on a regular basis as they like to perch on the tree roots and rocks.

Mangrove forests are under threat with being so close to the ocean as a lot of the land is being reclaimed for developing into tourist resorts etc.

The waters in these swamps are classed as hard 10 – 20 DH and as expected the pH is high, averaging 7.2 – 8.0. To recreate the brackish conditions the salinity should be set between 1.66 and 1.015.

Temperature of the tank needs to be set at 24 deg C minimum and 28 deg C maximum.

Setting up the tank

Coral sand makes an ideal substrate for the biotope, not only will it look attractive, it will also help to buffer the water to the correct pH. The mangrove roots can be created by using long branch like pieces of wood inserted into the substrate vertically. Good ventilation is a must as the brackish fish species are heavy eaters and will produce a lot of waste. A lot of keepers will only fill the tank halfway up with water and potted mangrove seedlings are then placed in the tank. The seedlings will then grow above the waterline allowing fish like the mud skippers to climb up to perch.

Plants for the tank

Due to the salinity of the water there are hardly any plants that will be tolerant of the conditions; one exception is the Java Fern. If mangrove seedlings are used be prepared for regular pruning to keep them low enough for the confines of the tank.

Fish for the tank

As mentioned mud skippers are my first choice for this biotope. They have some very unusual traits making them an excellent talking point. ON ability they have is to protrude their eyes out of the sockets to aid their vision; pulling them back in when normal vision is required.

Archer fish also show fine qualities when on the hunt for prey, they will shoot at insects with a spurt of water to dislodge them from leaves where they are ready to grab them from the water surface. If keeping these fish provide them with flies, crickets etc. for live food, but they will also accept flakes and pellets.

Scats can be added but these fish do grow quite large, be prepared to invest in a larger tank to home them. They are also herbivores; greedily eating any plants so do not add Java Fern with them as this plant is poisonous.

Puffers, Gobies, Glassfish and Celebes Rainbow fish also make for ideal inhabitants.



This is a bit of a specialised biotope and should be set up by an experienced keeper. In the article mudskippers are mentioned, these are great fish and can become very tame. They do require some banking so that they can leave the water and should be kept in brackish conditions.

Always add a lid if keeping these as they require a humid atmosphere inside the tank. Archer fish make great top swimmers and are great looking fish in themselves. They will

hover around the surface looking for food and will keep you entertained. If using brackish water then scats and gobies will make great tank mates for the above fish that are mentioned.

South American Blackwater Creek

Recommended size: 150 l (32.985 ga)

Description:

Black water creeks originate from the rain forests, tributaries from the main rivers slow down into slow moving creeks that are stained a coffee color from the decaying vegetation and fauna. Often fallen trees are found in these creeks providing hiding places for the aquatic life who have adapted to living in these very acidic water conditions. The water will appear relatively transparent but once the seasonal rains take place the water takes on a very different complexion. The water becomes muddy as the rains sift down the silt from the surrounding lands areas, dragging in even more vegetation and tree branches with it. There is no hardness to the water which explains the very low pH and the creek beds are made up from a fine clay or sand. Rocks are very rare in Black water creeks, so much so that the local inhabitants use rocks for trading purposes.

The canopies above are quite dense, blocking out much of the sunlight, these are favorable conditions for the more timid fish species and amphibian life.

The creek beds are normally orangey color clay with a couple of inches of rotting vegetation on top. Flood water creates several ox-bow lakes to the sides of the creeks which in turn will have their own inhabitants, often fish swept over with the flood water.

There is plenty of insect life above and on the surrounding banks of the creeks for the fish to feed on, especially in the rainy season when food is at its most obtainable. This is the time that most of the fish species will go into spawning mode.

The pH of the water is found to be 5.5-6.5, hardness is very soft (0-4 DH), and the temperatures are higher than most tropical areas, running at 26-29 deg C.

Setting up the tank

To recreate this biotope it is a fairly easy task with a little imagination. Fine sand or clay needs to be used for the substrate, laterite would normally be suggested but as the plants to be added are limited in this set up then stick with the cheaper option. Create formations using wood, mopani is ideal as it will help to reduce

the pH as well as adding tannins to the water to give the coffee colored effect. Be creative with the wood to create interesting shapes but don't make it look too formal, random is better. Random planting with the suggested plants should also be random, try to cover areas of the wood to provide hiding places. Lighting needs to be subdued and the water flow from the filtration should be very low.

Plants for the tank

Sword plants and Vallisneria is all that is needed for this biotope as the wood arrangements are the main feature. Sword plants come in a variety of sizes according to the species, so include several different species in the tank and use the Vallisneria as a back ground to middle ground plant. Always plant randomly.

Fish for the tank

This biotope can either be a discus or angelfish biotope but do not mix them. For the more inexperienced fish keeper I would recommend going for the angelfish biotope as they are a much hardier species. Tetras, especially cardinal tetras look really stunning if added as a small shoal, and for the bottom feeders a group of Corydoras will keep the substrate clean.

Other fish that can be used are Hatchet fish, Loricarids and Dwarf cichlids. Apistogrammas will always provide entertainment in the tank.



Like the SA black water biotope, Angelfish would be my choice of specimens to add to the tank. They will love the décor and planting, this is more suited to them than discus. Dwarf cichlids will also feel at home here and keep them in a 1male/2 female ratio. There are many species to choose from but I have a tendency to veer towards the Apistogrammas as they are quite hardy and will soon get to know you especially at feeding time. For bottom feeders add a couple of plecs but avoid the larger species. Try the ancistrus or Loricarids which do not grow too big.

South American Whitewater River

Recommended size: 150 l (32.985 ga)

Description:

White Water Rivers have a muddy brown color with little visibility because of the heavy sediment content. In the main river, there are almost no plants and mostly large fish unsuitable for the aquarium. Quiet back water areas like the oxbow lakes have more aquarium fish species and greater plant life. White Water Rivers include the Amazon, the Napo, and the Orinoco.

The Amazon is the largest river in the world if measured by water volume and has the greatest water flow into the ocean; this has led to its nickname of the River Sea.

It is however only the second longest river in the world, the Nile being the longest. One of its most famous inhabitants has to be the Boto (Amazon River Dolphin) alongside the infamous piranha fish.

The waters of these rivers are generally soft to medium hardness 3-8 DH, with a pH of 6.8-7.1. Temperatures range from 26-29 deg C.

Setting up the tank

The recommended size of tank for this set up is 150 liters (33 gallons) which is slightly larger than some biotopes but the important thing is length of the tank rather than depth unless you wish to add angelfish.

Fine gravel or clay should be used for the substrate with varying pieces of either driftwood or bogwood added randomly for furnishings. Open swimming areas must be included so try to keep the decoration to the rear of the tank. If you are creating an ox bow biotope add some floating plants for a realistic effect.

Plants for the tank

Vallisneria will make a good background plant with its long slender leaves. This plant propagates by runners, once it is well established it will need regular pruning to keep it in check.

Riccia Flutens, commonly known as Crystalwort, is classed as a floating plant. The best way of using it though is to attach to the wood and let it spread over to form a coating of green, this is also another plant that will need lots of pruning once it takes hold, but the display it produces makes it worth all of the extra effort.

Sword plants are a must with all of the South American biotopes in my opinion, mixing the various species will produce an even greater effect.

For the floating plants, either water lettuce or duckweed can be used, if they start to smother the surface it is easy to siphon areas off to reveal clear spots to allow the light through.

Fish for the tank

There is a large scope with this biotope for selection of fish species to use. If your tank is large enough Acaras will feel well at home. Eartheaters and angel fish can also be used, Oscars are from this area but if you add them they will probably try to rearrange the tank décor. For shoaling fish add some Tetras and Hatchet fish, I always find that cardinal tetras seem to work best in a shoal but these can be a bit more expensive than the other Tetras.

For substrate cleaners use Corydoras, they will do a great job scavenging for food, but don't forget that they also have their own dietary needs.

For a species only biotope there can only be one choice for me, a group of piranhas will give your tank that extra special look.



White water biotopes give you the chance to try a wide range of different species of fish. My first choice on this tank would be a shoal of piranhas; these are becoming very popular in the fish keeping hobby and are quite hardy. There are a few species of these to choose from but the hardest I have found are the red bellied piranhas. If these fish are not for you then try keeping a group of Acaras but they may try to dislodge some of the planting as they dig around. If you do decide to add the Acaras, Add a shoal of cardinal tetras or hatchet fish to accompany them.

Northen Australian Rainforest Creek

Recommended size: 200 l (43.98 ga)

Description:

Rivers in the Daintree are highly seasonable- smaller creeks may nearly dry up in the dry months, leaving scattered pools until the rains return. Typically the creeks are boulder strewn with river rocks and sand as the substrate. Water current alternates between fast flowing rapid sections and quiet pools.

The Daintree rain forest is situated in the far north of Queensland and hosts some of the most diverse and beautiful aspects of nature. This rainforest provides a home to the largest range of plants and animals on earth. The actual rainforest covers an area of 1200 square kilometers and is full of small creeks.

This area contains 30% of all known frog species along with a large number of reptiles. It is also host to 430 species of birds, 13 of these are endemic to this area. The actual age of the rain forest is believed to be over one hundred and thirty five million years old.

The water in the creeks is alkaline, this is caused by the water passing over the rocky land mass soaking up the minerals and the hardness can be found at 10 – 12 DH.

The temperature of the water varies a lot, in some areas it is measured at 24 deg C but in other areas it will reach a high of 29 deg C.

Setting up the tank

Providing the substrate for this biotope is relatively easy, fine sand for the base substrate and river rocks for the landscaping. Open swimming areas must be provided and a filter needs to be added to provide a water current in one area of the tank. Bright lighting should be used with crystal clear water conditions.

Plants for the tank

Vallisneria used as a back ground plant will give a good banking effect, mix in with some Aponogeton for a varied back drop.

Ceratopteris (Indian fern) can either be used as a floating plant or mid ground planting, mix this with some Bolbitis (African Water Fern) but keep the front of the tank unplanted to provide the free swimming area.

Fish for the tank

Rainbow fish make a good species for this biotope but use a lid on the tank as they are very good jumpers.

Freshwater gobies will add even more interest to the tank, going about their daily business in their own strange ways. There are a few species to choose from so research them before purchasing to see which suits your tank the best.

If your biotope is large enough try an Australian Arowana, a beautiful fish that does grow large but will live for years if cared for properly. You will find in some countries that Arowana need to be licensed with a certificate of registration, always check this out with your supplier before you decide to purchase this fish.

The beauty of this biotope is that a low stocking level will give a much more realistic effect, imagine a sparse desert under water and this is the effect you are trying to achieve.



As this biotope requires a low stocking level it gives you the chance of adding a large specimen fish, try the Arowana, they look superb but need to be treated with respect at feeding times, never try to hand feed them. Try to get the true Australian species like the Jardinii or the Leichardti for a true effect. If you decide that the larger fish are not to your taste then try adding a small group of Australia Rainbow fish but make sure you have a lid on the tank. To accompany these add some gobies for substrate sifters to make your tank maintenance easier.

New Guinea River

Recommended size: 200 l (43.98 ga)

Description:

New Guinea is located north of the Australian continent and is the world's second largest island. At one time it was joined to the Australian main land but separated when the area known as the Torres Strait was flooded over during the last glacial period. This is why the fish species that are found in New Guinea resemble those from Australia more so than the fish species from Southeast Asia.

The western side of the island contains the provinces of Papua and West Papua, the eastern side is the independent country of Papua New Guinea.

The main species of fish to be exported from this island is the Rainbow fish, this species is also divided into several sub species.

The water conditions are very easy to replicate being in the middle regions of hardness (4 – 8 DH) with the pH from 6.5 – 7.1. Water temperatures are on the lower side of tropical 23 – 25 deg C.

Setting up the tank

A minimum tank size of 200 liters (44 gallons) is recommended for this biotope as rainbow fish do require a lot of swimming space; a lid is also a must as these fish are well known to be jumpers.

Keep the planting to the rear of the tank and use sand as the substrate. Adding river rocks on top of the sand works well, bright lighting is also a must.

Plants for the tank

Vallisneria used as a back ground plant will give a good banking effect, mix in with some Aponogeton for a varied back drop. Ceratopteris (Indian fern) can either be used as a floating plant or mid ground planting, mix this with some Bolbitis (African Water Fern) but keep the front of the tank unplanted to provide the free swimming area

Fish for the tank

As mentioned earlier in the article, this is the perfect biotope for rainbow fish. There are several species but the most common available has to be the Bedotia. Adult size for these fish is 6 inches so a tank of at least 48 inches in length will be required. These are a schooling fish, a group of at least 4 fish will keep them

happy.

Freshwater gobies, in particular the pygmy goby, will add some interest to your tank. Always make sure that the species of goby you are purchasing is suitable for a freshwater set up, many species are happiest in brackish or even saltwater conditions.

Arius catfish, commonly known as the shark catfish are always on the move. I have kept several of these in the past and they are a very tolerant species but they can grow up to 15 inches in captivity, be aware of this when adding them to your aquarium. This species of fish also prefers to be kept in groups of at least 4 fish.

All of the above mentioned species will feel more at home with the addition of some salts to the water but add this in a mild dose.



With the layout of this biotope, fairly well planted and the décor, the first choice has to be a small group of rainbow fish. There are several species to choose from, if you prefer the larger fish then try the Boesemani, I prefer the smaller species like the threadfins; they can be kept in larger numbers and only grow to 2.5 inches maximum. They display their finnage to each other all day long but the males rarely become aggressive to each other. For the bottom dwellers, purchase some of the smaller catfish such as the eel tailed catfish, they will not get too large and will keep the substrate clean.

African River Rapids

Recommended size: 200 l (43.98 ga)

Description:

The Congo (Zaire) river has the second largest volume of water of any river in the world, yet it is classed as the most powerful river in the world due to massive

water currents that exist in certain parts of it.

It is estimated that 1,500,000 cubic feet of water pass through its mouth every second.

It begins its journey with peaceful water current but along its path it gradually widens and the water current increases in speed. There is a 75 mile length of rapids that are impassable by the river, traveling on land is the only way through.

The most famous region on the river has to be Livingstone Falls; the rapids extend for 220 miles in this area. Similar rapid conditions do appear on other African rivers but not with such intensity. This biotope is based on the Congo rapids but obviously only to a certain extent.

As with most of the African rivers the water is fairly hard (6-10DH), with a pH of 7.0-7.5. The temperature range is between 77-81 deg F.

Setting up the tank

The recommended size of tank for this biotope is 200 liters (44 gallons). The water needs to be highly oxygenated to create the rapid turbulence; therefore the water in the aquarium should be well-aerated with an airline. Leave plenty of swimming space but adding large river rocks for effect works well. The substrate should be fine gravel or sand. Creating the water current is not too difficult, placing the spray bar from an external to one end of the tank will work, and another option is to add a power head to give the same effect. I have seen some set ups where the current is provided by two sponge filters taking in the water which is then passed by means of piping to two power heads at the other end of the tank, this gives out a very strong current indeed.

Plants for the tank

Not many plant species are capable of surviving the strong water current, only use hardy plants that are well anchored or protected from the water current. The only plants really suitable for this biotope are the African Water Fern and the Anubias species. One way of anchoring the Anubias is to attach it to a length of slate with fishing line until its roots attach, the slate can then be hidden beneath the substrate.

Fish for the tank

Eutropiellus (African glass catfish) will love the strong water current and is a very peaceful species. This species is best kept in groups of six or more, solitary glass catfish do not fair well in the tank.

Syndontis catfish contain several species that can be found with wonderful markings but they do like hiding places in the tank with some floating plants for shade.

Distichodus added for interest, these are sometimes referred to as clown tetra, but don't let the name fool you, these fish can grow up to 15 inches in length.

Lamprologus are African cichlids, there are many species but most do not grow to a great size but they all have character as do most cichlids.



As this biotope requires a fast water movement, only add fish that are suited to these conditions. The African glass catfish would be my first choice; they are peaceful and prefer to swim around in small groups. African tetras are also ideal, examples of these are the Congo Tetra and the Clown tetras, but be aware that these will grow very large so use a tank capable of keeping them in. African cichlids like the Kribensis will suit this set up as well but provide hiding places for them if they need to rest from the water current.

Lake Malawi

Recommended size: 250 l (54.975 ga)

Description:

Lake Malawi was formed 1-2 million years ago. This geologically young, rocky lake of the East African Rift is about 375 miles (604 km) long and 53 miles (85 km) wide, making it the ninth largest lake in the world.

The lake is bordered by Malawi, Mozambique, and Tanzania. This lake is dominated by cichlids, most of which are endemic to the lake. Over 280 cichlid

species have been described, although estimates of up to 500 cichlid species have been made. The largest group of Cichlids found in this lake is the Haplochromines with over 120 species and 48 genera. Among the Haplochromines, are the Peacock Cichlids of the genus *Aulonocara*; the Mbuna, a large group, including the genera, *Cynotilapia*, *Labeotropheus*, *Labidochromis*, *Melanochromis*, and *Pseudotropheus*; and the larger piscivores of the genera *Cyrtocara*, *Nimbochromis*, and *Sciaenochromis*.

Water

pH 7.8-8.6, 6-10 dH, 23-28 °C (72-82 °F)

Tank

Provide plenty of rockwork and caves with hard alkaline water with a pH of at least 7.8. The bottom substrate should be of a material that will aid in the pH buffering capabilities of the water. Good substrate choices could be Dolomite or crushed coral to aid in buffering the water. Tankmates should be from the same area and be able to fend off their attentions.

Plants

Vallisneria is the only commercially available species, but *Anubias* and Java Fern are also suitable if the aquarist is willing to bend the biotope rules.

Fish

Lake Malawi cichlids (Mbuna, Peacock cichlids, Others), *Synodontis*.



For a Malawi set up it might sound obvious but only add Malawi cichlids. There are two main types Mbuna and non Mbuna, whichever you go for try not to mix the two. The Mbuna species tend to be less aggressive than the others if kept correctly and at the right ratios. There are many species of these like the Labidochromis; the most common of these is the yellow Labs. Other suitable species are Maylandia, Melanochromis and the Pseudotropheus.

If you wish to keep the non-Mbuna then try the Haplochromines, commonly known as Haps. They are less colourful than the Mbuna and grow slightly larger.

Tank mates could be any species of Syndontis catfish or even Ancistrus catfish.

Lake Tanganyika

Recommended size: 250 l (54.975 ga)

Description:

Lake Tanganyika has over 150 species belonging to more than 50 genera have been described, although many undescribed and undiscovered species are likely to exist. Geologists believe that Lake Tanganyika was formed 7-10 millions years ago, making it considerably older than Lake Malawi. Lake Tanganyika is located along the East African Rift and creates the borders between Tanzania and Zaire.

This elongated, rocky lake is 440 miles (708 km) long and sometimes as wide as 50 miles (80 km). Lake Tanganyika is a deep lake, with some parts exceeding the depths of 4,820 feet (1470 m). Unlike other lakes of its size, the water of Lake Tanganyika does circulate and a thermocline is not created. This phenomenon gives rise to a theory that Lake Tanganyika could, at its extreme depths, be heated by the earth's core. Even though the lake has a, relatively speaking, uniform temperature, most fish species only inhabit the first 450 feet (137 m) from the water's surface.

Water

pH: 7.8-9.0, 12-20 dH, 24-28 °C (75-82 °F)

Tank

A rocky set-up, complete with caves and ledges is recommended. The substrate should be fine gravel or sand, scattered with snail shells. Use an efficient filter

that creates little water current. Make frequent water changes since Lake Tanganyika species are especially sensitive to water pollutants.

Plants

Vallisneria is the only commercially available species, but Anubias and Java Fern are also suitable if the aquarist is willing to bend the biotope rules.

Fish

Lake Tanganyika cichlids including snail shell-dwellers, Synodontis, Afromastacembelus eels, Tanganyika Rainbowfish.



Tanganyika cichlids tend to be slightly easier to keep than the Malawi's; there are also several species that you can try. Frontosa are probably the most common species kept but other options include the Julidochromis, Lamprologus and Cyphotilapia species.

As with the Malawi, Syndontis catfish make great bottom dwellers as do the Afromastacembelus eels. There is actually a species of Tanganyika rainbow fish available so you do have several options on your stocking choices. As long as there are plenty of hiding places you should be able to mix and match quite a bit.

Central American Rocky Lake

Recommended size: 250 l (54.975 ga)

Description:

Central America has several great lakes like Atitlan, Managua, and Nicaragua. The lakes are rocky with hard, alkaline water.

The cichlids in these lakes are generally very territorial and aggressive and should not be combined in the same with peaceful species such as livebearers.

Lake Nicaragua is a large freshwater lake; it covers an area of 8264 sq. km and is the largest lake in Central America. In places the water will reach depths of 84 feet, and it was once well known for being a haunt of Caribbean pirates who would enter the lake through the San Juan River. This river leads directly to the Caribbean Sea.

As expected with rocky lakes, the water is very hard (15-25DH) and alkaline (7.5-8.2).

Temperatures range from 24-27 deg C.

Setting up the tank

The main décor in this tank is large, sturdy rock structures. Smaller tanks may struggle to provide enough space so a minimum tank size of 250 liters (55 gallons) is recommended.

Add the rocks first to build up your structure, and then add the sand around the rocks to form the substrate. The main reason for this is fish tend to burrow in sand; this will cause your rocks to topple if placed on top of the sand.

Water current needs to be kept low, turn down the outlets on your filters to replicate this.

Plants for the tank

Plants will struggle to survive in these alkaline, hard water conditions. Any that does will be destroyed by the cichlid inhabitants making it useless to attempt any planting at all.

Fish for the tank

Loricarids (armoured catfish) make for good substrate cleaners, these catfish like plenty of swimming room combined with hiding places if required. Many of the different species will only grow to a maximum size of five inches but be careful if adding two males to the tank.

Pimelodids (naked catfish) can also be added, these species will grow larger in size but with a 55 gallon tank this should not be a problem, Probably the most well known member of this family is the pictus catfish, if kept it should be housed in small groups.

Livebearers are one of the hardiest fish species, this makes them very popular with fish keepers and there is a great deal of choice. Bear in mind that cichlids are also going to be added to this biotope so the smaller species could be seen as food, select your inhabitants carefully. Sailfin mollies belong in this group and are extremely hardy, tolerant of a wide range of water parameters, and fairly easy to breed if you choose to do so.

Cichlids that can be added are convict cichlids, red devil cichlids, Texas cichlids and so on. It may be advisable to research the cichlid species you are interested in to try to get some of the less aggressive species. Some of the species will grow large like the jaguar cichlids so bear this in mind when selecting your tank.



Whenever I think of a Central American biotope, the first fish that come into my head are the larger Central American cichlids. There are many species to choose from, the main ones that I have kept in the past are the Texas cichlid, Convict cichlid, and the Jaguar cichlid. There are more but they all require the same needs as each other so these are just examples. Some of them do grow quite large but if you use the recommended tank size then this should not be a problem.

As the water is alkaline, it makes this set up ideal for live bearers, however do not mix these with the large cichlids or they run the risk of being eaten. Mollies and Platys are very hardy and will do well in here.

For the bottom feeders I would recommend pictus catfish or the Ancistrus catfish, if you decide on the pictus keep them in small groups as they are sociable with each other.

10. Fish Compatibility

One of the greyest areas in fish keeping is the debatable subject of which fish are compatible with each other. We all work on basic guidelines when we research the fish that we wish to add to the tank but what one keeper regards as compatible may be different to the opinions of another keeper. There are obvious fish that we would never place together in one tank but certain species may behave differently in different tanks.

The main reason that we need to know which fish will be fine in the tank is that it is still a sad fact of life that some pet stores will try to sell their stock to inexperienced keepers regardless. If you have done your research you are pre-armed ready to decide which fish are best for your tank.

As a general rule is never add a fish to a tank that is smaller than the other fish's mouths. If a fish can fit a fish into its mouth it will eat it.

Keeping fish that have an aggressive nature with fish from peaceful species is another big No!! No! The aggressive fish will terrorise the peaceful fish and it will only lead to a lot of stressed fish or even fatalities. The aggressive fish can even prevent the peaceful fish from eating by chasing them away from the food that is added to the tank.

Water parameters also have to be taken into consideration, some fish prefer acidic water, some prefer alkaline water, the temperature ranges may be different or even they way that they prefer the tank décor to be set up, all of this has to be taken into account before adding the fish. Even a slight difference in the preferred pH of the water can have a drastic effect on the well being of the inhabitants, there are some species of fish that are tolerant of wider ranges but this can all be researched before buying.

Tank size can have a diverse effect on a fish's behaviour patterns, keeping a large fish in too small a tank will affect their behaviour by making them more territorial and confined in a small space, this can result in fatalities.

Researching fish profiles and reading good fish keeping books will provide you with a lot of the answers but when you visit the pet stores ask as many questions as you can about the fish you wish to purchase, the more information that you have, the better your choice of fish stocking will be.

If you are adding fish of different temperaments to the tank, try to add the most peaceful species first and the most aggressive last. Add the fish in twos or threes, this can reduce the aggression on the new members.

The easiest way of working out the compatibility of the fish is to divide the different fish in to groups, this way you will know that members of one group will not be compatible with members of another group or they may be alright with members of certain groups.

Remember that we can only give guidelines, nothing is black and white in fish keeping, and this is part of the enjoyment of this hobby.

At aqua-fish.net there is an article covering this topic:

COMPATIBLE AQUARIUM FISH

There are many factors to consider when deciding which livestock you are going to add to your tank. Not only the tanks size, but you need to make sure that the different species you are going to buy will get along with each other. Most aquarists nowadays set up community tanks with a mixed variety of fish so this second point could be crucial in determining which fish to add.

Tank size does play a major part; you certainly would not contemplate adding a large 6 inch or over fish to a relatively small tank, providing it with no swimming room. Many species of fish become territorial over time, defending their space in the tank, thus resulting in injuries to the other tank mates; this is not something that keepers like to see.

There is a golden rule as well that most keepers stick to "don't add fish that are small enough to fit into another fish's mouth, they will eat it". This cannot be ignored! All fish have different temperaments, even within the same species. Malawis for example are constantly battling in the tank to obtain their own territories, as do some of the South American cichlids, yet some other cichlids can

live perfectly happy with each other if a correct balance is ensured by careful livestock selection.

There are many, reference books available, websites on the net, plus many forums on the net where the relevant information can be obtained so that your fish will live in conditions that will provide them with everything they need. There is a forum on this site that is available to everyone, full of information and helpful advice will be given for everyone, even down to the most inexperienced keepers. This can be found at forum.aqua-fish.net.

All of the books or reference sites will include information mainly on the required pH, water temp, dietary needs etc. Some species of fish prefer to lead solitary lives, definitely not a good choice for a community tank as they will hide and feel intimidated by other fish, even fish from the same species. Some fish are classed as timid fish, not the same as solitary fish, these like to be kept in shoals, at least including 10 members so that they feel secure and will be more at ease in the tank.

The order that fish are added to the tank can also affect the balance, always add the peaceful species first, and then add the more aggressive species later, giving the more timid fish time to settle in.

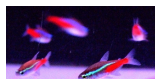
I will now try to give you some ideas as to which fish to add for a community tank, this is purely a rough guide, at the end of the day, only you can decide which fish to add.

Barbs, Rasboras:-

These are great little fish to add, although not all barbs are as well adapted to living in communities as others. I once added some green tiger barbs and they created havoc with the other fish, yet when I moved them into their own tank, they were excellent fish to keep. Cherry barbs (*Barbus Tittैया*), Harlequin rasboras (*Trigonostigma heteromorpha*), are really good examples of community dwellers. These are middle feeders and are extremely tolerant of other fish.

Tetras:-

There are so many species of tetras that are compatible in a community tank, making these one of the most popular additions to most keeper's tanks. I will list a few of the most commonly available on the market. Neon tetras are without a doubt the most sought after breed to buy but beware, they are classed as a timid fish and need good water quality, because of this they should not be added to a new set up, better to wait until the water has had time to mature.



Cardinal tetras are also well sought after, their colouration covering the whole length of the body. These are middle feeders and are best kept in shoals of at least 10 fish.



Glowlight tetras are a beautiful fish that reflect the light with great effect, another great addition to your tank.



There are far too many tetras to give you a complete list but these fish will mix and match in your tank.

Another important species of fish to keep in your tank are the bottom feeders as these will swim about on your substrate, eating all of the food that has managed to land there. Catfish are ideal, but remember, they also need their own food adding to the tank to keep them healthy. Also remember not to use too sharp a substrate as this can cause them damage while they are mopping up. My favourite type of catfish has to be the corydoras, of which there are quite a few species available, all with their own unique markings. One example of these is the corydoras adolfoi- this is my particular favourite.



Another peaceful catfish to add is the bristle nose, excellent algae eater, which means you can save a lot of time, not having to clean your tank so often.



A lot of keepers add cichlids to their tanks, which is fine if selected carefully,

normally angels and gouramies. A word of warning with these, if they pair up ready to breed, they will become very territorial in order to keep their space, the result of which could result in injuries to the other occupants.

Mollies and platys make good community fish, the only drawback being, if you are adding live plants, they may see them as food and strip down your tank in no time.

In every species of fish, there are always rogue members that could act completely out of character. Just because you have kept a male platy with no problems and have to replace it with another one, the new arrival may not act the same in the tank, so be prepared for this.

Experience in buying fish is soon gained, so plenty of research before buying is the best way to maintain a happy, healthy tank.

Never, ever impulse buy!!!

Pond fish

These include the standard goldfish, Koi, shubunkin, comets.

These fish are perfectly OK for pond fish but apart from the standard goldfish are not suitable for home aquariums as a long term home. They should never be kept in tropical tank temperatures.

Coldwater fancy fish

Fantails, Oranda, Black Moor, cap Oranda.

These fish need to be kept separately from Koi or standard goldfish; the fancy goldfish are not aggressive enough to defend themselves and will not be able to eat properly as aggressive species will drive them away from the food.

At aqua-fish.net there is an article covering this topic:

Goldfish

Carassius Auratus, widely known as “Goldfish”, is an ornamental ciprinidae, native from China, where it has been bred for long time. Being one of the first ornamental fish bred, goldfish has a great number of colour and shape mutations.

Mutations can be divided in two categories: “long body” looking similar to the wild-type, and “short body” that usually have a egg shaped body much different from the common goldfish.

“Long body” goldfish are the stronger ones and can live also in ponds; They usually reach 6-8 inches or more. Long finned are usually faster than short finned but can still live together without problems.

- Common goldfish: it has a stout body and short rounded fins, the most common colour is bright orange, but you can find also brown, silver, yellow and calico.

- Comet: it has thinner body and long caudal fin. Colours are the same of the common one.

- Shubunkin: its shape is the same of the common goldfish body, but has a heart shaped tail and is only calico coloured.

“Short body” goldfish are delicate and can live only in aquarium, they usually reach 4-6 inches and the most of them have swimming difficulties, so it is better not to mix the mutations and set up the aquarium with only a kind of goldfish. Cohabitation with “long body” goldfish is not possible, because the second are too much faster, stronger and bigger, so think about them as another species, and not as the same fish.

- Veiltail: it has rounded body looking like a egg, high dorsal fin and long doubled tail.

Oranda: it looks like Veiltail but has a hood on the head, that grows bigger when the fish reaches the adult size.

- Black moor: it has black, and sometimes golden, rounded body with telescopic eyes.

- Globe eye: it has the same characteristics of the Black moor but is red, orange, or calico coloured.

- Fantail: it has a egg shaped body and short fins.

- Lionhead: it has rounded body without dorsal fin, and like oranda it has a hood on the head.

- Celestial: it has a light rounded body without dorsal fin and upturned eyes.

- Bubble eyes: it is mostly like Celestial, but has a sack under the eye, like a bubble.



Aquarium life

Goldfish kept in aquarium do not need water heater, but the filter must be really powerful; in case of slow swimming fish reduce the pump speed. There is no need of special chemical values, anyway it is better to provide a medium hard water, a pH range between 6 and 7, and a good oxygenation. Goldfish often dig the gravel so choose strong plants, moreover they use to eat plants too and only the anubias seem to be not tasty for them.

As for the decorations choose rounded woods and stones, especially for goldfish with long fins, hoods and delicate eyes (like telescopic or bubble).

It is easy to overpopulate the tank, remember goldfish grow fast and produce a lot of refuses, so plan from 15 to 30 litres of water per fish.

Pond life

Only wild-type, comet and Shubunkin can live in ponds and there they easily grow really big. They can stand also low temperatures, anyway the pond has not to go under 32°F (0°C), and if the temperature goes under 50°F (10°C) is better to stop feeding the fish, because digestion gets really slow and make them sick.

Avoid the use of fountains with strong jets because goldfish swimming bladder is really delicate and can get damaged easily by fast water current or fountain jets.



Feeding

Goldfish are omnivorous and extremely greedy, they try to eat everything present in the aquarium or in the pond. Choose a good dry food at the base of their diet, avoid flakes and prefer granules because they are richer in nutrients and usually cause less problems. Food is maybe the most common problem with goldfish, they easily eat too much, or have digestion problem that develop momentary or

constant swimming troubles. Feed fish daily with few food and do a fasting day once a week; prefer foods easy to digest, you can also provide live fresh foods like meal worms and earth worms, or vegetables and fruits. Remember that fish in ponds, especially during spring and summer eat also a great quantity of insects and larvae. Moreover avoid to give bread, biscuits and other similar products because, even if goldfish eat them, they ferment during digestion and the generated gas develops in swimming problems connected to the swimming bladder right working.

Breeding

Goldfish breed also in aquarium but in pond is more common and easy. They reach the sexual maturity at the age of one year, anyway they start breeding when they are at least two or three years old. Sexual differences between males and females are few and hard to see, adult males have tubercles on the pectoral fins and gill, but sometimes some females have tubercles as well, so the best way to try breeding is to have at least a small group of 5-6 fish at least.

A young and healthy adult female can spawn from 500 to 1000 eggs. In case you are breeding them inside the aquarium it is better to remove the eggs, otherwise adults would eat them; while if you are breeding them in the pond you can also leave there the eggs, the most would be eaten, anyway fry have a lot of hiding places, and small food already present in the pond water.

If you have to feed fry in the aquarium use liquid foods, infusoria and brine shrimps. From the age of three weeks they can eat adult food.

Common illness

Goldfish are strong fish anyway they suffer specially of swimming bladder problems and water pollution.

As mentioned above, the swimming bladder of goldfish is really delicate and can get damaged by fermented food, infections and hits. If the fish swims slower than usual or in a strange position (a bit turned on a side) leave it without food for a day, because overfeeding is the first cause; if things do not go better maybe the problem is permanent, but is not a serious trouble if the fish can still eat and move.

Goldfish suffer water pollution because they need really oxygenated water, when oxygen level is low fish usually breath faster and look stressed; do some water changes, add an oxygenator for some days and solve the cause of water pollution (overfeeding, not working filter, overpopulation, poor oxygenation).

By aqua-fish.net, downloaded from <http://e1.aqua-fish.net/show.php?h=aquariumbook>; **Unauthorised use strictly prohibited!!!**



Peaceful tropical fish

These include Corydoras, tetras, Rasboras, Guppies, Platys, Danios, Mollies, certain species of catfish.

Apart from the catfish these fish need to be kept in small groups, they are peaceful and make good community fish but do not keep them, with aggressive tank mates.

Semi-aggressive fish

These include fish like the Barbs, Gouramis, Loaches, Eels, and Sharks.

The fish mentioned in this group are slightly aggressive to their tank mates but are OK with the other members of this group. Most of the aggression is dispersed if they are kept in small groups but a lot of the barbs have a reputation of being fin nippers.

Central American Cichlids

The species that belong to this group need to be kept with other members from this group; they grow quite large and will certainly be aggressive to smaller tank mates. Examples of these are Convict cichlids, Texas cichlid, Jack Dempsey, Oscars, Jaguar cichlids. These are compatible with many species of catfish especially the Syndontis species.

At aqua-fish.net there are articles covering this topic:

NEW WORLD CICHLIDS

On our planet there are at least 1300 species of fish that belong to the family Cichlidae. Yet the amazing thing is that they can only be found in certain areas of the world, these are Central and South America, and Africa. These species of fish are known to everyone as cichlids and they are the most colorful and interesting fish to keep.

But why are they only found in certain areas?

The answer to this is very simple. Before the continents split to what they are today there was one super continent in the south of the planet, this was called Gondwana. This is where cichlids first evolved and as the Gondwana split 150 million years ago, the cichlids were separated. Old world cichlids are to be found on the African continent, whilst the New World cichlids inhabit Central and South America. It is believed that the lineages have been evolving into the different sub

species for the last 90 million years.

Cichlids have become one of the most popular species of fish to keep in an aquarium for several reasons:-

- Most cichlids are quite easy to keep, water quality has to be maintained to a high standard, this will bring out the best colors and behavioral patterns in the fish but many cichlids can live for quite a few years.
- The different coloration to be found on the different species is quite outstanding, often when sold as juveniles, a lot of potential buyers will walk past them in the pet stores, because of this many keepers do not realize how beautiful the fish can become in time.
- A lot of fish keepers will start out fish breeding with cichlids as they will settle quickly into breeding set ups and given the right conditions will spawn many offspring. The parental care that they show to their young cannot be matched by any other fish.
- Cichlids will in time, get to know their keepers and become very tame, often accepting food from the keeper's hand. It may take them a couple of weeks to settle into their new home but they will soon realize who is supplying them with food.
- The new world cichlids can also be split down further by separating them into dwarf cichlids, larger Amazonian cichlids, and Neotropical cichlids. These cichlids will all have their own requirements in different tank set ups and difficulty of keeping levels, research should always be carried out before purchasing the fish, mainly to make sure that the tank you have will be large enough to cope with some of the larger cichlids that can grow up to 14 inches in length.
- Dwarf cichlids tend to be quite passive, as always there are exceptions to the rule, and often these will be introduced into community aquariums. The larger cichlids can be classed as an aggressive fish with predatory natures and are often kept in species only set ups.
- As mentioned earlier New World cichlids can become quite tame, this is not just through trusting their keeper but they have quite a high intelligence level, with this comes unique personalities that keepers soon learn to love.

Nearly all of the Central and North American cichlids are monogamous, when they pair up it is a strong bond between the two. Spawning is usually confined to the substrate, often digging pits in the sand for the eggs or laying them on rocks, even in small caves.

The South American cichlids are found in very acidic, black water regions. Some of these water conditions are quite difficult to replicate in an aquarium or breeding tank, but it is possible. The pH in some of the southern regions can be as low as 6 whereas in the central and northern regions of America there are very different conditions existing in small areas, because of this, these cichlids are good at adapting to varying aquarium conditions.

NORTH AND CENTRAL AMERICAN CICHLIDS

Nearly all of the Central American cichlids belong to a group known as Cichlasomines, they can be found in all types of waterways including lakes, streams, and rivers. Stunning coloration is definitely a trademark of these fish, but the downfall to them is that they can have quite quarrelsome behavior towards other tank mates. Most of the Cichlasomines will grow up to 8 inches in length; however there are some species that will only reach 4 to 5 inches. These fish need a lot of room in the tanks; the minimum size they should be kept in is at least 48 inches. Hiding places must be included for tank mates that need a rest from the harassment that the cichlids will dish out. Most keepers will provide these with plant pots laid on their side or even terracotta piping to simulate caves, anything that will provide refuge.

Any plants added to the tank will receive the same treatment as tank mates; they will be eaten or uprooted, most keepers will not add them for this reason. Cichlasomines will tolerate a broad pH range; 7-8.5 is acceptable as they do prefer alkaline water, unlike the South American cichlids that prefer soft, acidic water.

Most conflicts occur at spawning time as the males fight for the right to mate and to maintain their territories; this is why it is crucial to have lots of swimming space for a quick retreat if necessary.

Cichlasomines will accept almost any food that is offered to them, they are voracious eaters; care must be taken not to over feed them. Live foods are ideal, chopped earthworms, insect larvae, tubifex as well as flake and pellet foods. Part of their diet should also include vegetables such as spinach or peas.

When they have spawned it is normal practice for the female to guard the eggs, fanning them while the male will defend the "nest" warding off any fish that get too close. Even when the fry are free swimming this protective behavior will continue for a short while.

When the parents have spawned again it is wise to remove the original fry as they could easily become the next targets for the aggression. Several of the Central American cichlids are well known by their common names so I will now give a brief profile of a few of them, there are far too many to go into detail on them all.

Convict Cichlid

Scientific name - *Archocentrus nigrofasciatus*



Anyone who has kept this species of fish will know that it can hold its own against any fish, even ones that are much bigger than it is. It has earned the nickname the “aquatic rabbit” for good reason, it is almost impossible not to be successful breeding this fish. It is sometimes called the zebra cichlid due to the dark stripes that are all the way along its lavender blue body. The males usually have darker stripes than the females with a more pointed shape to the fins. The females will have pinker bellies than the males and are slightly smaller but have a rounder shape overall. Convict cichlids can tolerate a wide pH range, anything from 6.0 right up to 8.0 as long as the set pH is kept at a stable level. In my experience they are best kept in a species tank, I have always kept one male with two females, if kept with other fish they will bully the tank mates. This bullying has been known to cause death to other fish so its not worth the risk. They will accept any foods offered but a treat of vegetables and brine shrimp will improve their overall coloration. If you do decide to keep them with other species try them with Jack Dempsey’s or Red Terrors, these are about the only other species that can match their aggression. Water quality for convicts is not paramount but as with all fish the best quality you can get has to be for the good of the fish.

They are to be found in the wild mostly in Guatemala, El Salvador, Costa Rica and Panama.

If you do decide to breed these fish, plant pots laid on their sides will make

excellent spawning sites for the female to lay her eggs in.

Jack Dempsey Cichlids

Scientific name - *Rocio Octofasciata* (*Cichlasoma Octofasciatum*)



For quite a few years this fish has been a favorite of many of the cichlid keepers. These are very intolerant of other fish so they are better to be kept in a species tank. The tank size is very important with these as adults they can reach a size of 10 inches in length. Because of this juvenile fish are quite happy to be kept in a tank of 48 inches but be prepared to invest in a larger tank for the adult fish. Jack Dempsey has a somewhat elongated body compared to some of the other cichlids and the males may develop a hump on the forehead as they mature. In the male fish the dorsal and anal fins are pointed; with the females the fins will be shorter and more rounded in appearance.

The coloration of the male is a base color that is dark brown but in spawning season this can change to a dark blue. On their sides they will display a very lucid blue or green dot. Their cheeks and gill covers will be covered with blue dots and the lips should be a pale blue. The female Jack Dempsey tends to display less coloration than the male.

These are yet another easy cichlid species to care for; all foods that are offered will be accepted, especially live foods. In the tank there should be plenty of hiding places like caves or rock piles, also include some driftwood to create more places for them to investigate. They will need open areas as they will spawn in pits dug

into the substrate so use a fine gravel or sand. Once a breeding pair has established they should produce spawns time and time again.

Texas cichlid

Scientific name - *Herichthys Cyanoguttatus*



The Texas cichlid is not a fish for beginners, it is renowned for its feisty temperament but it is still a popular choice for avid cichlid keepers.

Its natural habitat is in the Rio Grande around Texas and Mexico and in the 1970's this species was introduced to the Philippines.

As an adult it will reach a length of approx. 12 inches, bear this in mind when adding it to the aquarium, definitely nothing less than 48 inches in length. It has a wonderful golden coloration that is flecked with pearls highlights. White and turquoise dots are also scattered over the body and fins. On some of the Texas cichlids you may see three black bars on the body. In spawning season the blackness of the stripes will intensify and the belly may also darken. This fish is not so easy to sex but females tend to be smaller than the males with slightly less coloration.

A single Texas cichlid should be kept in no less than a 75 gallon tank, if keeping a pair together then you should be looking at using a 125 gallon tank at least. As with the Jack Dempsey, hiding places created from rocks and wood are ideal, try adding some plants to create small territories. The plants that are used should be quite strong and hardy as the Texas cichlid will dig burrows in the substrate which will sometimes uproot the plant life. Floating plants should be added to provide some shelter in the aquarium.

Filtration needs to be of a high standard along with plenty of water changes, as these fish are sensitive to a drop in the water quality.

They will accept most foods but add vegetables to the diet and some high protein foods like earthworms.

Eggs are normally laid on a flat surface like a rock which the parents will clean first, but be warned prior to the spawning the male may be aggressive to the female. Just before the eggs are due to hatch the parents will dig a pit in the substrate nearby, when the fry are born they will be moved into the pit while the parents keep guard.

To summarize, Central and North American cichlids tend to be very aggressive species, choose their tank mates carefully. They can tolerate a wide pH range but prefer the lower temperature scale; normally the tanks will be running at 24°C as a maximum. Most of the species are prolific breeders and show a lot of parenting skills.

SOUTH AMERICAN CICHLIDS

From all of the cichlid species the South Americans has to be my favorite. There is such a diverse range of fish, all with their own traits and personalities. Sizes of the species can vary from as small as three centimeters in length right up to 60 centimeters in length. Unlike the Central and North America cichlids, these species generally prefer soft, acidic waters and in some cases the water quality has to be of the highest of any fish kept in an aquarium. Planted tanks are more often than not advantageous with the South Americans but research the species first as some will still uproot plants and cause havoc. There are many popular species in the pet stores, the most famous has to be the angel fish, Oscars too have many fans, and my particular favorite are the discus family. Most of the species are easy to breed given the right conditions but as many generations of tank bred have reached the stores a lot of keepers miss out on the natural coloration of the wild caught fish. Most of the species are to be found in the Amazonian basin and in my experience tend to be a bit more docile than the fiery Central American cichlids.

Altum angelfish

Scientific name - *Pterophyllum Altum*



To me this is what an angel fish should be. I regard these as a pure angel fish species but there is a lot of debate on this subject. They are related to the common fresh water angel fish that are so easily found in the pet stores, but from my experience the Altum are a lot harder to keep, demanding the best of water conditions. They are to be found in Brazil, Venezuela and Colombia, it is not so long ago that they were thought to only exist in the Rio Orinoco but have now been discovered in a much wider area. These are definitely not fish for beginners, as mentioned above water quality has to be tops with them, they can be purchased in pet stores but demand a much higher price than the common angel fish. A true Altum can reach up to 12 " in height so they should only be kept in tanks that have a good depth to them at least 30 inches in my opinion. Bogwood, Amazon swords and java ferns make excellent additions to the tank, if you are considering adding any other species of plants check them out first as the temperature of the tank needs to be set at 28-30°C , and with a pH ranging from 4.5-6.5 a lot of plants just will not survive. As with most Central American cichlids the water flow should be low to imitate natural conditions, these fish do not like a fast current. Sexing these fish is extremely difficult but if you do get a pair then they will prove to be very good parents, a lot better than the common angel fish. The easiest way to get breeding pairs is to add a group of 8 fish and let them pair up themselves.

Scalare Angel fish

Scientific name - *Pterophyllum Scalare*



Scalare angel fish are what I refer to as common angel fish; they are to be found in the pet stores in their thousands and are very popular indeed in the aquarium hobby. They do not grow as high as the Altum Angel, an adult may only reach 6 inches in height, because of this, shallower aquariums are often used to house them.

There are many variants this species as a lot of hobbyist breeders have successfully raised these; they are a bit more tolerant of water conditions. The tank set up should be the same as the Altum Angel fish although they will be quite happy with a slightly higher pH, 6.5-6.9 is ideal.

The secret with keeping the Scalare happy is to feed a varied diet, this should include flake foods, brine shrimp, mosquito larvae, and like discus fish, will enjoy a treat of minced beef heart. They will nibble at algae, in fact when I used to clean my tanks; they would follow the magnet cleaner around waiting for the algae to disperse into the water. They are not so good at parenting their fry as the Altums, but in time they do learn the basics. I found that the best way to raise the fry was to move the parents into another tank and then raise them myself.

If the Scalare are not happy with the water conditions that you provide they are prone to refuse to eat, if this occurs try doing a large water change and keep checking the parameters to make sure that they are fine.

Disease resistance is quite high in these, definitely higher than in the Altums, but if stressed they are prone to bouts of Ich.

Pike Cichlids

Pike cichlids belong to the genus *Crenicichla*. They are to be found all over the South American continent but most of the species inhabit the Amazonian regions where they are found in rivers, streams and lakes.

These fishes also need high temperatures in the aquarium, but as with all fish species, there are exceptions; so do your research first.

These fish are natural predators; they have an elongated body with a wide mouth. Some of the larger species will grow to 24 inches, at the other end of the scale, the dwarf species will only grow to 4 inches. They will hide in the tank waiting for their prey to swim past, and then they will lunge out chasing their prey until they grasp it. Rocks and bog wood will provide the required hiding places in the tank, adding live foods will give the fish keeper plenty of opportunity to observe this dynamic behavior. There are a couple of species that have developed their hunting techniques to catch insects on the water surface as well.

Keepers do keep Pike cichlids in planted tanks; they may up root the odd plant but in general will leave most of them alone. If you are not too sure about adding plants try out java fern or anubias attached to bogwood. Recommended tank size is no less than a 50 gallon tank, however if you do have a smaller tank try out some of the dwarf species. Strong filtration is a must with excellent water quality, if the quality drops the Pike cichlids will quickly begin to suffer or even die. As with other delicate cichlid species be prepared to do a lot of large water changes weekly to maintain the highest water quality. pH needs to be kept between 5.0 to 6.0, Pike cichlids also require very soft water.

Pike cichlids are very good parents, they will lay their eggs in caves or hollows and once the fry are hatched the female will tend them while the male will guard the nest, dispersing any would be intruders. The main thing to watch with the fry is that they must be size graded into separate tanks as they develop, if not the larger fry will look at the smaller fry as meals and devour them.

Oscar cichlids

Scientific name - *Astronotus Ocellatus*



Oscar cichlids are very popular in the aquarium hobby; these fish definitely have strong personalities and a high intelligence quota. I have always nick named Oscars as puppy fish due to the amount of attention that they need to keep them happy. My Oscar used to take great delight in swimming into my hand and allowing me to stroke his belly every day. If I missed a day he would get moody and decide to re-arrange the contents of the tank. They will even do wagging motions with their tails or swim in a strange fashion if they were after food. So if anyone is thinking of keeping these fish they must be prepared to spend time with it to keep it occupied or they will get bored, this could then lead to the fish having health problems. Oscars will grow big so a large aquarium is required, at least 100 gallons, in captivity they will grow up to 12 inches in length. Feeding them is definitely not as problem, they are carnivorous so will accept meaty foods with gusto; they are particularly fond of earth worms, feeder fish and beef heart. Insects should be included in their diet, crickets available from any pet store are ideal.

They are not aggressive to similar sized tank mates but never add smaller fish to the tank, these will be seen as food.

Water conditions are tolerated over a broad range but for optimum conditions they should be housed in a pH between 6.5-7.0 and soft water. Temperature should be set between 22-26°C, other than that they require no further needs.

Their natural habitat is the Amazon River, normally in the tributaries around Brazil and Paraguay.

The tank set up should be quite simple but not barren as they will move everything that they can if they are in a playful mood, they will definitely move everything if they are not happy.

In the tank I would suggest only adding a sand or gravel substrate with a few scattered rocks lying about. Check the rocks before you add them to make sure there are no sharp edges which could injure the fish. It is advisable to check the running gear in the tank daily as they will dislodge filter pipe work or internal thermometers at every opportunity.

Oscars can be bred in the aquarium, but be warned if you are thinking of doing this. They lay a lot of eggs in the wild as the mortality rate is high, it is slightly better in the aquarium but a lot of eggs/fry will still be lost.

Sexing the fish is not easy; they look exactly the same, the only true way of knowing if you have a female is if she lays eggs. Buying a group of Oscars and letting them pair on their own is the only way of getting a pair for a breeding project. They need to lay their eggs on a flat rock or something similar, if this is not provided they will dig a pit in the substrate until the glass is showing and then lay their eggs there. Patience is definitely a virtue with these fish; they will go through their mating rituals for months before they decide to lay. Jaw locking and chasing each other around the tank are a couple of give away signs to look for.

The conclusion

I could go on for ever describing the various species of New World cichlids, there are so many to choose from. Several good publications are available that will supply lots of information about keeping these fish, do lots of research before you buy.

Make sure that the aquarium you have will be large enough to house the species that you are interested in keeping.

Always be aware that the Central and North American cichlids will show quite a lot of aggression to their tank mates, so be prepared for it.

The South American cichlids will generally all require very acidic water, if your mains water is too alkaline it may be a good idea to invest in a reliable RO (reverse osmosis) unit, these will lower the pH of your water but it will need to be re-mineralized to be able to support your fish.

You may have noticed that I haven't included a brief description about discus in this article, the reason for this is that there is already an excellent article on this website that I strongly recommend you read through.

The Jack Dempsey Cichlid

Originally from Yucatan peninsula, Guatemala and Honduras, the Jack Dempsey Cichlid belongs to very beautiful, but aggressive fish. It's named after the

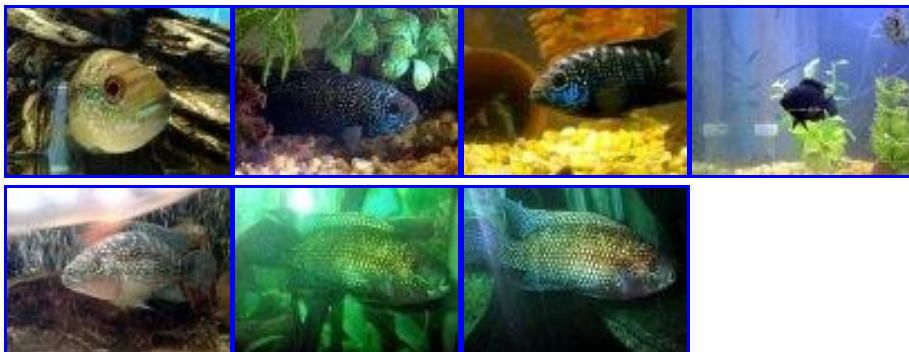
heavyweight boxing champion, Jack Dempsey. This fish can grow up to 20 cm (7.8 in), so it is recommended to keep it in a larger tank. As the Jack Dempsey Cichlid originally came from Central America, the water should be alkaline and little bit harder (dGH 18.0 - 30.0 °N and pH of 7.0 – 8.5). You can find the exact values of water chemistry and temperature in this fish profile - The Jack Dempsey Cichlid. The temperature in a tank has to vary about 25°C. So if you keep it under the right water conditions, its colours should be as beautiful as possible. You will enjoy this fish for more than 15 years as its lifespan is usually 16-17 years. The Jack Dempsey Cichlid has several colourful speckles across its body and almost a stained glass effect on the dorsal fin that will be displayed especially in the proper lighting. Healthy Jack Dempsey Cichlids should have an attractive muted purple colour with a black spot on each side of its body.

Always keep young Jack Dempsey Cichlids with other cichlids of similar size and aggressive temperament so they won't fight each other to death. Lastly, when your fish grow up to an adult size, you should keep them alone if your fish tank isn't large enough for pair or more of them. I recommend you to use a tank that has at least 2700 litres of water (1.5m x 1.5m x 1.2m). Try to create as many hiding places as you can, like caves, rocks, some driftwood to make an interesting environment. Males can be aggressive towards females (and also towards other males), as they are usually larger.

Like most cichlids they will accept food such as cichlid pellets, gold pellets, cichlid flakes and frozen food. Feed young fish 3 times daily. Adults should be fed at least 1 times a day. You shouldn't keep them in a tank with live plants, because they will eat them. As they like to dig, gravel must be at least 12cm (5 in) tall.

Breeding the Jack Dempsey Cichlid goes like typical cichlid breeding. The female will lay eggs and the male will follow up and fertilize them. Of course, they will breed on a piece of slate as soon as they clean it off. When all eggs are laid, the female will start to fan them. The male will protect her until eggs they hatch after 3-4 days. Newborns will start to swim a few days after consuming the yolk sac. Small fish should be removed from that tank once they reach 1.5cm (about 1/2 in).

1.



South American Cichlids

These include the Discus, Angelfish, Keyhole cichlids etc. They are semi aggressive to smaller tank mates especially the Angelfish who will eat smaller fish. Certain species of Tetras are fine with Discus like Cardinal tetras but always check before adding them.

Malawi Cichlids

Malawi cichlids can also be split into two groups- Mbuna and non-Mbuna. Never mix the two sets of cichlids as this will lead to lots of aggression in the tank.

Mbuna are very aggressive and need to be kept in groups of at least 12 fish to help slow this down.

Non-Mbuna is less aggressive but also need keeping in groups to spread the aggression around else one fish will get picked on and will eventually die.

At aqua-fish.net there is an article covering this topic:

MALAWI CICHLIDS

Keeping Malawi cichlids is definitely not for the faint hearted fish keeper. They are all aggressive species, but if kept in the correct conditions can provide hours of entertainment watching go about their daily life.

All of the Malawi species originate from one place, Lake Malawi in Africa. It is one of three rift lakes in Africa, the other two being Lake Victoria and Lake Tanganyika, but the amazing thing is that Lake Malawi is almost entirely inhabited by cichlids, the other two hosts a variety of fish.

There are more than 600 species of cichlids in this lake and they are endemic to it, you will not find them anywhere else in the world. Some keepers will divide the fish into smaller groups, but to me there are only two groups, mbuna and non-mbuna.

Mbuna cichlids

Mbuna cichlids are the most aggressive, they are to be found in the rocky regions of the lake, as there is less space in that region they have to spend more time defending their territories. Mbuna are smaller than the non-mbuna and have some fantastic coloration on their bodies, in their natural habitat their main diet is algae

growing on the rocks and any small crustaceans that they can find.

Among the most popular species on mbuna sold are Melanochromis, Cynotilapia, Labidochromis and Pseudotropheus. Out of all of these personal favorite has always been the Yellow Labidochromis (Yellow Labs), their coloration has always shone out for me.



Non-Mbuna cichlids

Non-Mbuna species include Aulonocara, Cyrtocara, Nimbochromis and Lethrinops. These are larger fish than the Mbuna and supposedly less aggressive, I have never found a lot of difference in the aggression myself. These occupy the larger areas of the lake, so defending territories is not so much of an issue but their diet is omnivorous only.

Most of the scientific world agrees that all the endemic species of this lake evolved from one species over a time span of thousands of years, this I find well fascinating as all of the species display uniquely vivid coloration, as well as this there are varieties in some of the body shapes. Keeping Malawi with fish from the other two lakes together has been proven in the past to be a bit of a nightmare, they have different dietary needs and biotope set ups, keeping them in separate tanks has always been the most successful.

It has to be the intense coloration that attracts fish keepers to the African cichlids, the males will provide an awesome display when they are in breeding mode, but a lot of buyers miss out on the fish as the juveniles will often be bland or toned down taking on the females colors, because of this they are often ignored in the pet stores. Another problem that this can cause is trying to sex the fish at a young age, when I have setting up breeding projects I have relied on buying a group of six fish and letting them pair up naturally. As these fish are so aggressive selection of tank members has to be thought out carefully. They do not tolerate their own species trying to invade their territories. Only add to your tank one male from each species, with some of the Malawi fish the females can be as volatile as the males, in this case it can be a matter of trial and error with selecting the fish. Even species that are similar in coloration will provoke aggression, careful planning is the best way to try to control this.

There are a few ways of dealing with the aggression if it occurs, against all fish keeping principles, over stocking the tank will reduce it. The theory behind this is that with high stocking levels the fish will have problems establishing territories. The only downside to this is that the filtration used in the tank must be to a high enough standard to cope with the extra waste load that the fish will produce. Dither fish can be introduced; these are fish that are capable of escaping the aggressors before they are injured. Malawi fish if threatened will kill other tank members to defend their spot. One method I have used is to add any new livestock in the evening when the lights have gone off; prior to this I re-arranged all of the rockwork in the tank so that all of the tank members have to establish new territories at the same time.



Malawi Tank Setup:-

Lake Malawi has little to no vegetation in places, the lake shores are rocky and the substrate is very sandy. This needs to be replicated in your tank. Plenty of rocks should be added to the tank, build them up and create loads of hiding places for the fish. Think of it as a freshwater reef and you will soon know how to create it. Make sure that the rocks are safe for your fish; a rock with jagged edges can cause injuries, only use the smoothest rocks that you can find. To assist building your rock formation, I found milliput to be an invaluable epoxy to hold the rocks together. Place the rocks in the tank before the substrate, if you are worried about scratching the glass on the tank bottom or wish to spread out the weight of the

rock, place some polystyrene pieces underneath them.

The reason for this is that some of the Malawi will burrow into the substrate; if this is done underneath the rocks it can cause a landslide.

I have never added plants to a Malawi set up but if you wish to do so use hard plants like vallisneria, anubia or cryptocorynes. The roots will need protecting from attack, this is done by placing small pieces of rock around the base of the plants, preventing the fish from burrowing into the roots. The plants will not only look decorative but they will also aid the filtration system, removing nitrates from the water.

Substrate can be ordinary sand but I have found crushed coral sand to give the best results in the tank. Malawi fish require hard water with a high pH, the coral sand will act as a buffer to bring your water parameters to the required level.

It doesn't matter how nicely you set up the tank, the Malawi fish will rearrange everything to suit themselves. This can be very frustrating when the tank looks all nice and neat, then the fish start leaving piles of gravel all over when they have been burrowing or the plants have been uprooted after all of your effort. This is a burden the Malawi keeper has to put up with. The tank size for these fish is usually larger rather than smaller. Most Malawi keepers will use at least a 1000 liter tank, sometimes up to 2000 liters, the bigger the better. With all of the territorial squabbling going on space is limited anyway, give them as much as possible. As a good rockwork system is required, depth of the tank is also important, use the deepest tank you can.

Always remember, the larger tanks will be very heavy when full of rocks and water, make sure that the tank is supported properly on the floor and that the weight is evenly spread.

Plants and rocks in the tank are used as boundaries for the different territories, the fish will respond to any change in their environment, hence the trick of moving rocks when adding fresh livestock.

The pH of the water should be kept at a lower reading of 7.8, and anywhere up to 8.5. Never let it drop below the minimum; if it does there are ways to increase it which I shall write about later. Malawi need hard water, the GH should always be above 10, keeping the KH to at least 8 will ensure more stability of the pH. Temperature of 26 deg F is ideal.

As mentioned earlier in the article, the filtration in a Malawi set up has to be very high. Five times the tank volume is the least amount of water flow per hour that is required. With all of the burrowing and food consumption that is taking place there will be a lot of suspended detritus floating about in the water. This needs to

be pulled out by the filters very quickly. I would recommend using two external filters so that the water flow is spread evenly across the tank; the other advantage is that twice the media can be added to them. The externals will need to be cleaned on a regular basis, with all of that detritus floating about, the sponges will block themselves eventually, this will then reduce the water flow.

Dietary needs:-

- One of the biggest problems with Malawi fish is Malawi bloat disease, this is caused by giving the fish the incorrect diet and is very difficult to treat.
- Mbuna require a vegetable diet. Pellets and flake food is alright for these fish, supplement it with some spirulina as well.
- Non Mbuna are omnivores. Blood worms and tubifex should be included in the diet, as well as brine shrimp, but keep varying the diet to prevent the fish from becoming bored with the same food.

Breeding Malawi's:-

If your tank is kept in optimum conditions with high water quality there should be no problem getting all of the species of Malawi to breed. Feed the fish well and they will spawn on a very regular basis. A lot of the fry will be eaten by the tank inhabitants if the females are left in the main tank, to prevent this if you are interested in breeding properly, the mother fish should be moved to another tank until the fry have reached a juvenile age. Nearly all of the Malawi cichlids are classed as mouth brooders. The female will lay her eggs on either the rocks or on the substrate in the tank, the male will then pass over the eggs and fertilize them. Once the eggs have been fertilized the female will pick them up into her mouth and incubate them until they have hatched out into fry.

After 2 weeks of mouth brooding the female will release the fry into the water, at this stage they are free swimmers, completely able to feed themselves. Most of the females will still protect their fry for several days, she will scoop them into her mouth at any signs of danger, this will also take place in the evening as the fish are getting ready to rest. One advantage of this is that it means the survival rate will be higher than leaving the fry free swimming around the tank.

If the mother has been moved to a separate tank, leave her in there for at least 2 weeks while she is carrying the eggs, trying to net her beforehand can result in the eggs being swallowed or eaten. There is no point offering her any food as she will not eat until the fry are free swimming, it is good practice after the mother and fry have been separated to isolate the mother in her own tank so that she can be given high protein foods to build up her strength again.

Sometimes it is difficult to see if a female is carrying or not, but with experience

there are signs that will give it away.

Not so many years ago it was common practice to strip the females of fry so that she could be returned to the males quicker, this would then increase the regularity of the spawning. Nowadays this practice has almost died out and I must admit I was never keen to see this done. When the female was stripped of fry it meant she was netted after the first two weeks of producing the fry and then her mouth was forced open. This would fool the fry into swimming out into the water, as the fry were free swimming, they could be left in a rearing tank to develop. I could understand it being done if the female needed medication or there was a fear of the eggs being eaten but not just to induce extra spawns.

The drawbacks with “stripping” the fish were that the female fish from stripped mothers were more likely to eat their eggs and the males that were produced had duller coloration. Forcing the fry is not a natural way to breed fish; a true fish lover would never indulge in this practice.

Feeding your fry is very easy, newly hatched brine shrimp is readily taken, the liquifry food for egg layers is also suitable if you do not have a brine shrimp hatchery set up. Food should be offered at least 4 times per day initially, as the fry progress, probably two weeks later is adequate, move them onto baby fish food or tetra growth food two to three times per day. A couple of weeks later they should be able to consume the same diet as the parents but if giving them flake or pellets, crush it first.

Water changes are very important for the fry, anything up to 90% per week for the first two weeks, drop this down to 75-80% for the next two weeks. As with all fry that are produced the first 4 weeks are the most important times in their development. After the initial 4 weeks the water changes can be reduced further, right down to 50% per week for the next 4 weeks. At 2 months old the fry are now advanced enough to be either put into your main tank or moved on to other keepers.

Aggression in the Malawi:-

In any aquarium there is a pecking order, even more so in a Malawi tank. Males will not only try to dominate males from the same species but any other species as well. Top of the pecking order will be the alpha male, this fish rules the tank. He has earned the right to chase away all of the other fish, he will have his pick of the females to pair up with. This can cause problems with cross breeding if several species are included in the tank. He will try to mate with any female that takes his fancy. Bottom of the pecking order will be any new additions or any of the weaker fish. In time these fish will work their way up the pecking order till they find their place, but as this is happening there will be a lot of aggression in the tank. Some keepers make the mistake of removing the dominant fish to try to

reduce the aggression, but as the alpha fish has gone, another one will take its place, it is best to leave the pecking order as it is.

To make things even more complicated there will be a pecking order with in each of the separate species, and to make matters even worse, this will include the females trying to establish their place.

When it is spawning time the pecking order will change as the males are all trying to become a mate to the females, even more aggression, but once spawning has taken place the original pecking order will be resumed. This is why I mentioned at the start of the article that keeping Malawi is not for the faint hearted fish keepers, and definitely not for novice fish keepers. There may be casualties in the pecking order process but these are usually kept down to a bit of fin nipping or side nudging, but if one of the fish is sick it will not take it long to drop to the bottom of the pecking order and if nothing is done it will not survive. Watching the tank should be done on a daily basis, observe the fish to make sure that they are swimming about in a normal fashion, look out for any signs of diseases as sick fish will need to be removed to a hospital tank for treatment if it is required.

New fish added to the tank start from the bottom, for the first couple of weeks they will try to keep a low profile, probably hiding a lot, if attacked by another fish they will try to swim away out of trouble. However after the initial 2 weeks they will start to fight back, this is to get their place sorted in the hierarchy and is perfectly natural. The same process will occur if a fish has been removed for a period of time for whatever reason. Once re-introduced, it will have to work its way back into the pecking order. As I have mentioned earlier, when adding new fish re-arrange the rockwork to disturb territories, add the newcomers in the evening when the lights are out, the current inhabitants will be at their most sluggish. Sometimes these precautions will still not prevent a new fish from being bullied to the extent that it will not survive, observe the new fish for the first couple of weeks, if it is looking stressed and sickly after that time it will have to be removed.

Buffering your water:-

If you are having problems keeping your pH to the required levels then this probably means that the KH of the water is too low. One of the easiest methods of raising this is to add to your tank water sodium bicarbonate (baking soda), this should be done as slowly as possible. Raising the KH will stabilize the pH of the water to the required level. As the buffer is added, keep testing the water so that you know how much to add.

If low pH is a recurring problem, one of the reasons could be that the water flow is too low. Increasing this or agitating the water surface with a spray bar will release the CO₂ from the water quicker, this will then allow more oxygen to be

dissolved into the water which will then raise the pH.

Malawi fish can be an interesting group to keep, if the tank is set up properly and there is plenty of swimming space, lots of hiding places for the fish, then the tank will give hours of enjoyment.

These groups are guidelines and there are instances where a mixture from some of the aggressive groups have worked in a keepers aquarium but if you are not sure about it then don't mix them.

11. Fish Breeding

One of the most amazing sights to any new or semi-experienced fish keepers is seeing their fish produce young, accidentally or intentional. The sense of pride is great and you also then have the knowledge that if the fish have bred they must be happy with the way you are looking after them. What has to be taken into consideration is that if you intend to carry on breeding your fish the need for extra tanks to raise the fry is a must not a luxury.

At aqua-fish.net there are articles covering this topic:

Breeding Tanks

Introduction

I have just completed a little project in between the others on the go to build some breeding tanks. This has been very successful and so I thought it would be helpful to share the method of construction with you all, hopefully saving you money!

The method is simple, cheap and effective. The object is to build 4 breeding tanks as a single unit, which can sit on a shelf, mount on a wall or almost anywhere you have space.

Over the next few days, I will be building another one, and will keep a record of the progress for you to see how it is done.

Materials:

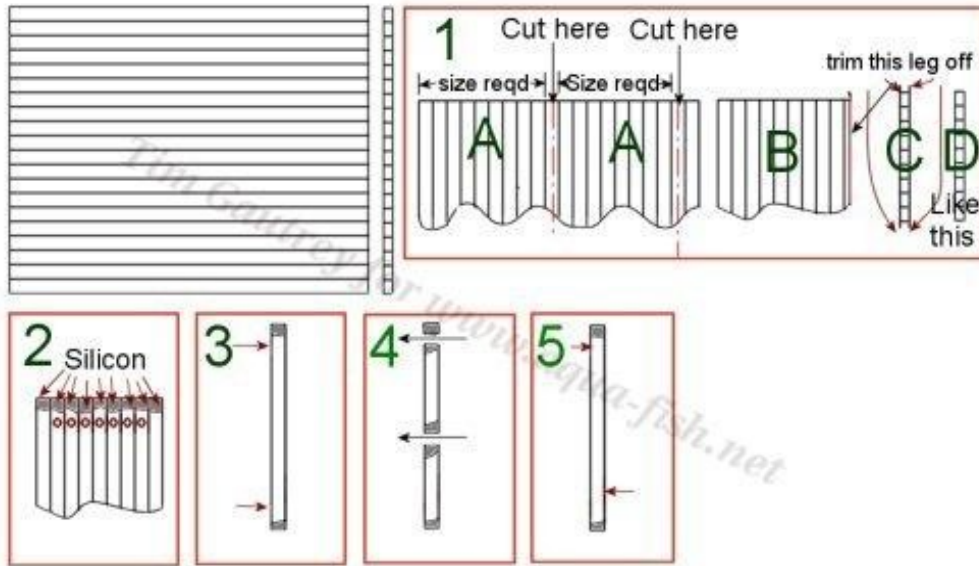
- 1 sheet of 12mm polycarbonate sheeting (3m x 1m)
- 2 tubes of aquarium safe silicon
- 1 roll of masking tape
- 2 pieces of glass. (For this build, the measurements will be 7"x36" but can be cut to suit your own requirements)
- 1 100W heater (Short type, Hydor do a nice one just the right size for this build)
- 1 Small powerhead filter (Fluval 1 would do, so long as you can connect a pipe to the outlet)
- 1 pack of Fluval 2+ filter media
- 1 length of 2" electrical surface trunking
- 2' length of pipe to fit the outlet on the powerhead. (I used the tubing from my gravel vacuum!)

With a lot of the above materials, you will have enough to make several of these units, so keep them handy!

Step 1

Decide on the measurements. For this build, I will make the unit 18" high x 6" deep x 36" long. this size fits very well onto wall shelving and will hold 4 x 2 imperial gallons.

Step 2



Drawing 1

Mark and cut the polycarbonate sheeting to the sizes. When cutting the sheet, cut through the center of the ribbing over the size you require and then trim back to the rib on both edges. (See drawing 1A,B,C & D) Be very careful not to break through the ribbing. It is a bit of a tricky thing to do, but once you get the hang of it, it's easy. (I used a small angle grinder with a steel cutting blade to trim mine back, but a sharp craft knife and glass-paper will do the job just as well)

For this build, the back panel will be cut at 18 x 36, ribbing running horizontally
two side panels at 18 x 5 1/2, ribbing running vertically
bottom will be cut at 6 x 36, ribbing running horizontally
upper-bottom at 5 1/2 x 35, ribbing running horizontally
center divider is cut in two parts, one at 11 x 5 1/2 and the other at 6 1/2 x 5 1/2.
ribbing running vertically.

Step 3

Fill the ends of the ribbing on the upper bottom panel at both ends and smooth off. Now things get a little more difficult! Use a drill to make holes in the polycarb as follows:

Drill a row of 10mm (7/16th) holes through the one skin only, in one of the end panels 1 1/2" from the bottom edge and another at 16 1/2" (Drawing 2 & 3) and fill both ends of the ribbing with silicon and smooth off. (don't block up the drilled holes though!) These holes will be the channel for the water flow from tank 2 to tank 3.

Drill a 20mm (11/16th") hole 10" from the bottom of the other side panel through both skins, and another hole the same size as the tubing from the powerhead 17" from the bottom. (Drawing 4) Again, fill all the ribbing with silicon and smooth off. In this instance, seal the broken ribbing inside the large holes with silicon. This will take the pipe from the powerhead in tank 4 to tank 1 and let the power cord out.

The two center dividers need to have a row of holes drilled at the bottom on one side and the top on the other side as drawing 5, 1 1/2" from the bottom and 5 1/2" from the bottom. This allows water flow from one tank to the next. As above, seal top and bottom with silicon and smooth off.

Step 4

Once everything has been cleaned, de-burred and drilled, you are ready to start assembly. If you have never used silicon before, practice on some offcuts until you can get a nice even bead running along the edge of the polycarb. The nozzle can be trimmed to suit yourself, the smaller the nozzle the finer the bead you get. I would recommend that you have a nozzle of about 3/8th inch trimmed at a 45 degree angle for best results.

Start by arranging the pieces in order and pre-cut the masking tape into roughly 4" strips. You will need quite a lot of strips, so make about a dozen to start with. You need to decide which side you want the pump now. All the water flow will depend on whether the pump is on the left or right. I instinctively install my pump on the left, but you might want to have it on the right.

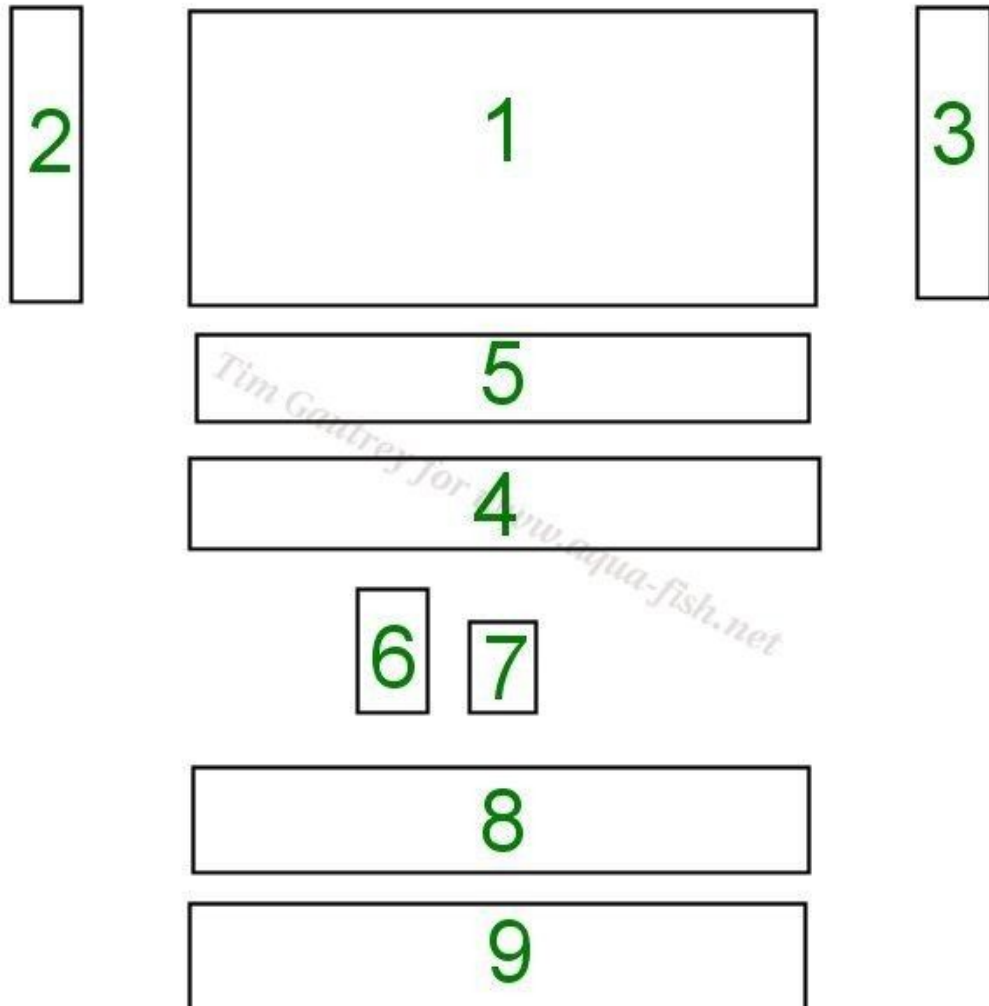


Image 2

Take piece 4 and stick some tape strips under the back edge, leaving about 2 1/2" free. Take piece 1 and run a silicon bead along the bottom edge. Place the bead firmly onto the back edge of 4 and run the tape up over the join onto the back panel. (This will be very unstable and an extra pair of hands may be useful to hold this join while you get the next piece ready.)

Take piece 2 and bead the back and bottom edges with silicon. Stick a few more strips of tape onto the underside of the bottom on the LHS and also on the LHS of the back panel. Carefully place 2 onto the bottom LH edge, tape and then bring the back panel onto the bead and tape there too. Press firmly on all joints, squeezing the silicon out of the sides of the joint. You now have the start of the unit!

Don't hurry this, take your time to get it right, it will save problems later. Adjust the joints to align the edges flush on the outside and press firmly into position. You should have the LHS and Back sitting on top of the bottom panel, and, if you got the sizes right, the front edge should be flush too.

Ok, so far, so good. The silicon will stay workable for around ten minutes, so once the joints are right, you can use the back of a spoon handle dipped into soapy water, or your finger to smooth the inside into a curve across the joint. If there isn't enough silicon squeezing out of the joint, run another bead down the inside of the joint to ensure an even curve all the way along. when it's done, it should look like image 6!

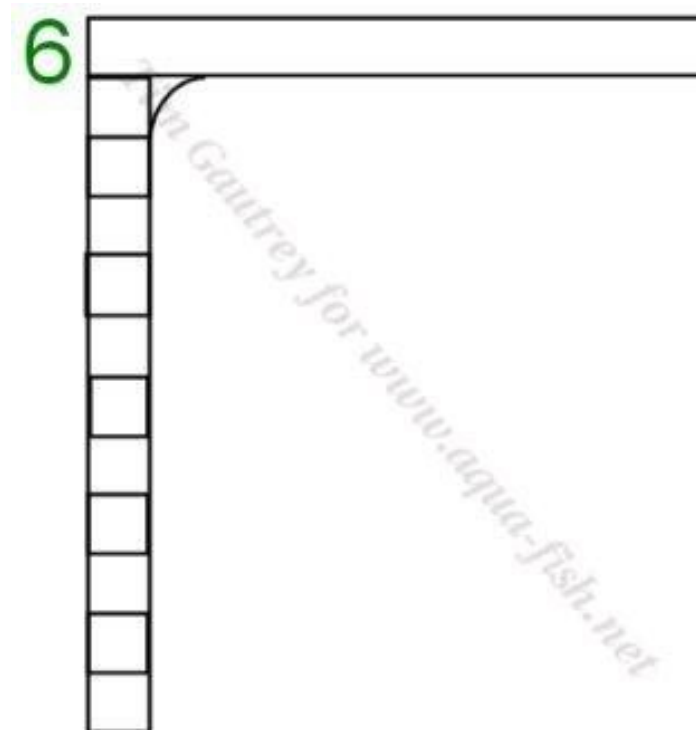


Image 6

Be very careful now, as these joints are still unstable and will slip out of line if you're not careful. Now take 3 and bead the bottom and back edges as you did with 2. More tape and sit it on the RHS of 4. You now have three sides and a bottom. Line up the edges and bead it in as previous. You may find it easier to lay the assembly onto the back panel now.

Now mark the center of the back panel with a pencil or felt pen. this is where the bottom center divider, (6), goes. Check that the flow direction is correct, with the top row of holes on the opposite side to the pump. Bead the back and bottom edges and place on the center line, pressing it firmly against the bottom and back

panel. This cannot be taped into place, so you may have to re-position several times before it's right.

Take piece 8, the glass front panel. bead all the edges of the polycarb, bottom, sides 7" up, center divider. carefully align the glass panel onto the beads and tape in place on all sides. smooth the inside round now, as you won't be able to get to it easily later.

Step 5

Leave the assembly to dry for an hour or so, or until the silicon has skinned over. This will help to stabilize the assembly for the next phase. Take the electrical trunking and cut a piece long enough to fit between the front and back panels. (Should be about 5 1/2 "). Remove the top cover and trim off one leg, leaving an L shape. Silicon this in place level with the bottom of the top row of holes, leg facing upwards. This is a bit fiddly, but it works. The bottom two tanks are now complete!

Step 6

Measure 7" from the top and mark on both ends. This will mark the top tank base. (Assuming the measurements and cuts are right, it should sit straight onto the bottom center divider.)

Bead the back and both ends of 5. Also run a bead along the top of the center divider. Again, a second pair of hands is useful here. Ease the side panels outwards slightly and slide 5 into place. The polycarb should give enough to do this without breaking the seals if you are gentle. Release the sides and press firmly against 5. press 5 firmly against the back panel. As long as the silicon hasn't gone off too much, the panel should push into the rounded beads on both sides. If it doesn't, just trim them with a knife where the panel fits in, so that they don't stop it sitting tight to the back. (Difficult to explain, I know, but I hope you can understand what I'm getting at.)

Bead and fit the center divider, (7) again making sure that the flow runs the right way, (top holes same side as the pump). Press firmly into place and bead the inside of all joints.

Now you can fit the other glass front, (9), by beading all the edges and carefully positioning and taping in place. All things being correct, the top should line up all round. If the glass is slightly below the top, you can adjust it by sliding it up a little to line up flush with the top of the polycarb.

Allow the silicon to skin over before fitting the other two trays to the top tanks. Seal these in place and leave overnight to allow the silicon to fully cure.



Fish Breeding

People mostly don't have fish tanks for breeding purposes, since they like to watch them acting like in the wild. However, a natural part of life in nature is breeding. Of course, some aquarists breed fish for money too. Taking care of any fish could be relatively expensive and breeding is one way to get invested money back. Naturally, there are specialized fish keepers who breed various fish species for a living. Moreover, some of professional fish breeders are very specialist and they try to 'create' new species or new colour variants, and some of them try to keep species in danger alive for next generations.

Anyhow, even if it might look easy, fish breeding is not as easy as it seems. Nearly all fish species require special conditions for breeding, otherwise they eat their eggs, newborns, or other fish will eat them this is the most common reason why newborns die.

There are numerous factors affecting readiness for breeding. The best way to breed your fish is to copy the conditions which they need to breed exactly (usually like they have in nature), in the tank. These factors include, but don't limit to, pH, dH, temperature, food and light conditions. Conditions in a fish's natural environment change according to the seasons of the year which means more food,

higher temperatures in one season than in another. This is the reason they breed at special times as everyone they want to breed when newborns have enough food and suitable conditions for growth.

The most important impulse for fish from rivers near the equator is when water temperatures get lower than usual. It is because they breed in season, when there is much rain and the rain cools the water. Then the rivers flood and fish can naturally find more food. The easiest way to imitate such conditions is to warm up the water for few months on 30 or 32°C (bear in mind your fish's requirements, since such temperatures may lead to unpredictable deaths of non-tropical fish species!!!) and then cool it down to 25 or 27°C for a few days. Rain might cause changes in the water chemistry too. It includes pH and water hardness level. That is how fish know it is time to breed. Unlike tropical fish, fish which come from moderate climate zones breed after changes in lightness. The amount of light is not very important for fish living in tropical climate zones, because the light there is almost the same throughout the year. Food plays a very important role in breeding. Naturally, fish breed when there is enough food (use live food for tank-kept fish) for them as well as well as their babies. It is because that live food has many vitamins and maybe fish are stimulated because they can hunt when the conditions are similar to the conditions in nature.

First, you should forget about guarantees on general suggestions on fish breeding, since there are no exact rules how to make them reproduce for sure. It simply means that everything that you have heard or read may be not true. Every fish is an individual and nobody told them how they should act or, in our case, breed. They act how they feel. That is the reason why you can find homosexual couples too. It is a usual scenario, if there aren't enough opposite sex partners. But when they find any, they become heterosexuals again. Some fish are hermaphroditic and some fertilize themselves. A very interesting species is *Poecilia formosa*. It is a natural hybrid between *Poecilia latipinna* and *Poecilia mexicana*. This fish requires a male of one of those species in order to produce babies. However, each child is a female. Moreover, any male doesn't give her any genetic material. Basically, there are many, many mother's clans.

The basic division of fish according to their breeding habits is spawners and livebearers. Then we divide fish according to how they take care of their fry. Livebearers give birth to their fry once the fry is able to care for themselves alone. The female feeds the fry inside her body until they are able to survive alone. Unlike livebearers, the fry of spawners are powerless when they are born. That's why spawners have so many eggs. More eggs mean more fish which can survive. Some spawners have not so much eggs, since they protect them until they're able to survive, or they hide them. According to this we can divide spawners into egg-layers, mouth-brooders and bubble nest builders.

Egg-layers don't breed very easily in the tank, because they may eat their own

eggs, or the eggs can be easily eaten by other fish. Even though they try to hide the eggs, usually there aren't enough places where it is impossible for other fish to find eggs easily. This is the reason why it's best to separate parents and put them into an aquarium where they can be alone and after they breed successfully, move them back to their home aquarium. When the eggs hatch, they need special food. They can't be fed normal food for adults, because they can't eat it; Newborns are too small. Only after they grow up a bit can they eat crushed food. If you want to breed egg-layers, the worst choice of filter is the ground filter, because small eggs can be sucked into the filter and killed. The best substrate is about one centimeter big round rocks or glass rocks. The eggs can easily fall between them and the small fellas are safe. Some egg-layers bury eggs, or they make a small hole for them. In order to give you an example, let's talk about Angelfish a bit; Breeding the Angelfish species might be easy, but sometimes some problems occur, such as the partners are two females and they both release eggs. In this case, the eggs are not fertilized, so they can't hatch and they turn to fungus. Discus fish take care of their Newborns in a very interesting way. The mother produces a kind of slimy liquid and the babies swim around and feed on it.

The major part of mouthbrooders are cichlid species. A mouthbrooder is a kind of fish which defends its eggs. When appropriate the mother usually collects the little buddies into her mouth, or she collects the eggs and the male's sperm in her mouth. It is the best way to be sure, that all the little guys are fertilized. But mouthbroodeers, like all cichlids (Angelfish and Discus are cichlids too), are relatively difficult to breed because they chose partners; they will not breed with every fish. And if they don't breed, you don't have any other choice, only to get/buy a new male or female and to hope that your old cichlid will like him or her better than the first one.

The speciality of bubble nest builders is, as the name says, building bubble nests. Those nests are made from males saliva. A typical bubble nest builder fish is the Betta splendens, Paradise fish or Gourami. First, the male (possibly together with female) builds the nest, then he gets the eggs out of the female, puts them into the nest and then fertilizes them. When the eggs hatch, the little guys are powerless and the male even has to get them back into the nest, so they can breath. The male defends the nest against the female all the time, until his children are big enough.

Livebearers can be divided into groups too. To be exact, into two groups. The real livebearers and pseudo-livebearers. The real livebearers' fry are fed inside of the female, from blood circulation, but pseudo-livebeaers' fry are fed inside an egg which is inside of the mothers belly. The most common livebearer is the guppy fish and swordtail.

There are many methods that fish have evolved over the years to give birth and protect their young but they can be categorised into different groups. The first group of fish to be

mentioned is normally where we all start from and get hooked on trying out different, more difficult species to breed- the first group is headed under livebearers.

Livebearers

Basically the term livebearer is self explanatory. The fish in this group will give birth to fry that are free swimming and developed enough to hide for the first few weeks to prevent them from being preyed on. Due to the rapid breeding that these fish perform, the livebearers tend to be the cheaper species available to buy and once you have a breeding tank running, you will soon have more fry than what you know to do with. Species of livebearers include Guppies, Mollies, Platies, and Swordtails. There are other species that use the same method but these are the most common ones.

The eggs are fertilised by the male internally, he has a modified anal fin called the “Gonopodium” that has grown to form a tube for passing the sperm into the female. The eggs develop inside the female and are fully formed when born, they may lack the colouration of their parents but this soon develops.

Many keepers add females to their tanks and wonder why fry are born a couple of months later, the female can store the sperm for up to 6 months and will keep producing during this time.

Examples:

Platies

Platies are part of the Poeciliidae family which means they are part of the group of livebearers. *Xiphophorus maculatus* and *Xiphophorus variatus* are the two different platy species from which all platy variations are bred for aquarium purposes. Platies are very similar to swordtails, so much that they are even able to mate with one another and produce fertile young. This is one of the reasons why there are so many different variations of platy fish available. There are over 325,000 known varieties of platy fish. The different varieties of platies display diverse coloration and patterns, and some even have fins of different shapes and sizes. This is a great fish for beginning aquarists because of their ease of keeping and breeding. They get along well with other species in community aquariums.

Platies are originally from the freshwaters of Mexico, Guatemala, and Honduras. They are now bred commercially in Florida and from areas around the Pacific Rim. Although platies are highly adaptable fish, they prefer medium to hard water that is slightly alkaline. The optimum temperature for raising platies is between 70-77°F in a well planted and brightly lit aquarium. They need clean, fresh water,

especially when breeding as is common with most other fish. Their diet should consist of plenty of veggies although protein should be provided as well. Platies do not require all that much space when you have just a few but it is probably best to keep them in a tank that is larger than necessary, at least 10 gallons. The reason for this is their highly reproductive nature. It will not take long for them to multiply and they live an average life span of 2-3 years.

In the wild, platies are found in shallow, lowland rivers in areas with a slight current. As is true with most livebearers, the varieties found in the wild tend to be plainer than those bred in captivity. Wild caught platies are usually grey with black speckles and clear fins. Selective breeding is necessary in order to obtain the different color, pattern and fin variations.

Sexing of platies are very easy and fairly straight forward, as is with all other livebearers. Male platies possess a modified anal fin referred to as the gonopodium. The gonopodium is used to inseminate the female while mating. Female platies are generally slightly larger than the males reaching approximately 2.5 inches whereas the males usually reach about 1.5 inches.

Breeding platies is one of the easiest things for an aquarist to do. Add one male, one female and some water to an aquarium and in a matter of weeks you could have little platy babies swimming around. That is just the gist of it, there is a little more to it than just that. Platies should have a well planted tank for breeding and living. Once the female is inseminated by the male and becomes pregnant she will be able to store the sperm in her body allowing her to have several broods without having to mate again. Before she gets too close to the end of her pregnancy she should be moved to a tank of her own. This tank should be set up with plenty of plants for the babies to hide in.

Platies are not notably great parents. They have the tendency to ignore their babies or worse yet, look at their newborns as food. In order to help the babies survive you must place the mother in a densely planted tank before she gives birth. The babies will instinctively hide among the plants to seek coverage. The new babies are independent swimmers as soon as they are released from the mother's womb. They are able to fend for themselves as long as food is available. They will require a well balanced diet of lots of protein and some veggies to ensure proper development. If you give them high quality foods they will yield brighter, more radiant colors.

If not carefully bred, platies can lose their brilliant coloration over several generations. In order to produce the best results, selective breeding needs to be carefully controlled. In doing so, the finest specimens are bred in order to keep the color and fin variations that are desirable. Young virgin females are separated from males before they reach sexual maturity in order to keep them pure for breeding with carefully selected mature males.

X. maculatus and X. variatus will cross breed with one another quite easily. Usually, when this happens, the resulting species is renamed; however, in this case the resulting platy is named according to which ever variation they more closely resemble. The X. variatus lack the sail fin or fancy tails but have a slimmer, longer physique. There are other species of platy known, but they are not sold for retail aquarium purposes.

Popular variations of X. variatus:

- Golden platy variatus
- High-fin golden parrot platy variatus
- Green platy variatus
- Calico platy variatus
- Blue tuxedo platy variatus

Popular variations of X. maculatus:

- Blue wag-tail high-fin platy
- Black platy
- Blue platy
- Pintail red wag-tail platy
- Salt and pepper platy
- Sunset marigold platy
- Red-wag high-fin platy
- Blue coral platy

Pictures

Xiphophorus maculatus





Xiphophorus variatus



Mollies

Mollies are interesting and popular fish from the family Poeciliidae. They are freshwater livebearers; which mean they give birth to live young, much like guppies, platies and swordtails. There are several varieties of molly, some of which are readily available to the aquarium industry. Their colors and fin variations make them a highly desirable species for keeping. They are hearty and easy to breed which make them a great pet for novice aquarists.

All molly fish are named under the genus *Poecilia* in reference to their coloration. Each of the molly species has a name that represents what make them different from the other molly species. Some of them are: *Poecilia sphenops* which means wedge-like appearance, *Poecilia velifera* refers to its sail bearing dorsal fins, and *Poecilia latipinna* describes this molly's broad dorsal fin.

Molly fish are brackish or fresh water species that are native to waters along coastal salt, brackish and freshwater regions of North Mexico, Guatemala and Honduras. Populations of several molly species were transported to New Zealand, Western United State and Hawaii to control the mosquito population. This was possible because of the molly's ability to adapt to different water conditions.

Mollies are well known in the aquarium industry as being one of the easiest types of fish to take care of. They are not very particular about their water conditions, types of foods, or breeding habits. Amateur aquarists often start off by raising mollies when they are getting to know the aquarium keeping hobby. Mollies are attractive, colorful fish that are inexpensive and nonviolent. They tend to get along very well with most other peaceful fish. Though not all that particular, their optimum water temperature is anywhere between 68-82°F with a pH of neutral to

slightly alkaline. Mollies are slightly hyperactive so they are best kept in a tank of 30 gallons or more to provide plenty of free swimming space where they prefer to live in groups of 7 or more. There should be plenty of plants available for the fry to hide among until they are too big to be looked at as food. Mollies have developed the upward turned mouth which indicates they are in fact surface feeders. They will eat any and all prepared foods that are small enough to fit in their mouth but they should get some extra veggies for better health.

Sexing

Sexing is very easy for all the *Poecilia* species. The males have a modified anal fin known as a gonopodium which is used to inseminate the female while mating. The males have elaborate color and fin displays with which he can either impress a potential mate or intimidate other males.

Breeding

The male has to mate with the female just one time in order for her to be able to produce several broods. Most female livebearers are able to store sperm in her body until she is ready to get pregnant. This can happen multiple times over the course of her lifetime. You can tell a female molly is pregnant when you see a gravid spot or dark spot on her plump belly near her anus. A female will produce approximately 60 fry per brood and can become pregnant again within a matter of weeks. It is best to separate a pregnant female so that the male cannot eat their young.

Caring for the young

Members of the molly family do not have good parenting skills. Once the brood is born the mother will go about her daily business of grazing and swimming as if nothing unusual has even happened. A densely planted birthing tank is required for the well being of the young fry. They are born ready to fend for themselves but not big enough to defend themselves. They need an area to seek refuge and safety which is where the plants come into play. Feed the babies a quality diet of newly hatched brine shrimp and microworms. Try to incorporate veggies into their eating routine for a well balanced diet. Because they are so small they should eat small portions 3-4 times each day. Be sure to perform partial water changes every other day to keep the water fresh and clean.

Selective breeding

Special colors and elaborate fins are not traits that mollies possess without the selective breeding process. The finest specimens are taken and bred to create and sustain all of the best traits admired in the aquarium industry. Many different phenotypes are combined to produce sail fins and lyre tails, colors of black, albino and marble, as well as balloon shaped bodies. Selective breeding is done by separating high quality virgin females and exposing them to males with superior

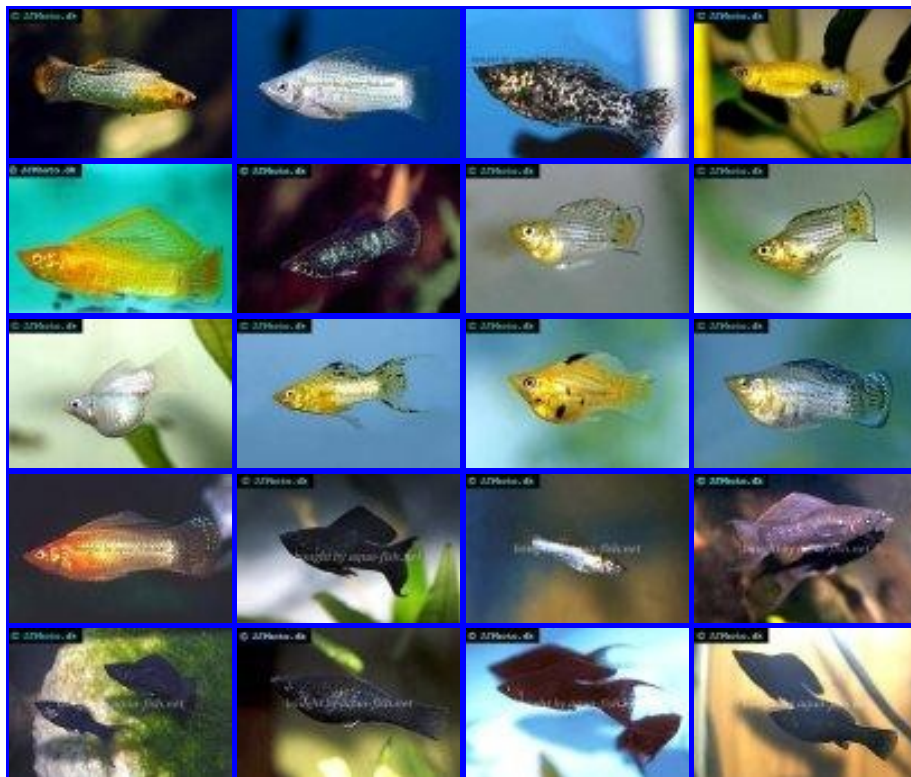
traits. To prevent unwanted mutations and deformities, breeders are careful to not combine any fish that are related to one another.

Different Poecilia species:

- *Poecilia velifera* is also known as the Yucatan molly because that is where they are found. It is hard to tell the difference between the sailfin molly and the Yucatan molly because they both have the sail-like dorsal fins and grow to roughly the same size of 2.5 inches in captivity. When in the wild the Yucatan molly grows larger than 4 inches.
- *Poecilia latipinna* is commonly known as the sailfin molly. As stated in its name, this molly has a fin like a sail which is a highly prized trait in the aquarium industry.
- *Poecilia sphenops* is the dull silvery colored wild type molly. This common molly species can mate with the different molly species to produce the hybrids found in aquatic retail stores. The black molly is one of the strains produced from breeding *P. sphenops* with other molly species.
- *Poecilia formosa* is a hybridized version of the sailfin and pacific Mexican species. This Amazon River Molly from South America is the first unisexual vertebrate to be discovered who reproduces through gynogenesis. This means the female of this particular species does not need male fertilization in order to reproduce. In fact, the males of this species almost do not exist. For every 10,000 females produced there is one sterile male Amazon River Molly. Even if there were more males available they are born unable to reproduce, so without the females' amazing ability to self fertilize, this species will have long since ceased to exist. To make the situation even more interesting, the females are not completely independent in reproduction. In order to reach full sexual maturity and to be able trigger ovulation, the female Amazon River Mollies need to mate at least once with a male. Males from similar molly species are used to mate with just once. The sperm collected from mating has no part in fertilizing the eggs. The mother's eggs already contain the genetic information to complete the process of making new young. Instead of getting half of their genes from the mother and the other half from the father, the Amazon River Molly babies get their complete DNA from the mother. They are basically clones.
- *Poecilia butleri* is also known as the Pacific Mexican Molly. This species grows to a maximum of 4 inches and can be somewhat aggressive in comparison to the rest of the molly species. These grey or black mollies with orange markings come from Central American brackish waters from North America to Guatemala and Honduras.

- Black Mollies are reputed to lack strong immune systems. Along with the mutations that come along with the selective breeding process comes the change of unseen traits. One of these is the weakened immune system and their high susceptibility to the bacteria known as Myxobacteria. This bacteria attacks black mollies more so in freshwater aquariums and can be thus treated by adding 1 oz. of salt for each gallon of water in the aquarium. Of course, this treatment should not be utilized in tanks that contain species whom cannot handle that amount of salt.

Pictures



Guppies

Poecilia reticulata also known as guppies, are among the most commonly kept fish in the aquarium industry today. Nicknamed, the “million-fish” the guppy is known to be a highly reproductive species that readily spawns in any given environment. Guppies are in the *Poecilia* family and are a live-bearers which means the females birth to live fry after being inseminated by a male. This fish is selectively bred for the purpose of developing a unique array of color combinations and finnage displays. The excitement of breeding these interesting little live bearers is to see what kinds of combinations will be produced next.

The guppy comes from various freshwater regions in South and Central Americas as well as the Caribbean, and is easily adaptable to a wide range of temperatures between 66-82°F. They thrive in soft or hard waters of neutral to alkaline pH (7.0-7.5) growing up to 2.5 inches in length. Guppies are a non-aggressive species who like to live in a well planted tank containing no less than 20 gallons of water, with other small non-aggressive species. Flowing, well-filtered water is required for optimum guppy care. They will eat just about any type of foods that are fed to them including fresh or frozen brine shrimp, live insects small enough to fit in their mouths and prepared flake foods. Aquarium bred guppies are definitely a lot different from those that are wild caught. The elaborate displays of colorful fins are a direct result of carefully selective breeding. Wild caught guppies known as Endler's livebearer are dark-olive green to gray in color and their fins are shorter, not as elegant. In the wild, this fish is known to live in fresh and brackish water so aquarium salt is recommended as a part of keeping them in their optimum conditions.

Guppies were introduced to several other parts of the world as a way to control mosquito and insect populations. They eat the mosquito larvae once they hatch from their eggs on the water's surface. This process only works because guppies were so highly adaptable to the different water conditions they were introduced into.

Sexing in this species is fairly straight forward because guppies are sexually dimorphic. This means the male of this species have elaborate color and finnage display while the female of this species is plain and lacks elaborate decoration of any kind. Although some females may have misleading color and fin displays as a possible result of inbreeding mutation. The males are generally smaller while females tend to be larger. The more reliable way to sex this species is to look for the gonopodium on males. This is a modified anal fin that is used to impregnate females.

The guppy is called "million fish" specifically for its capability to reproduce again and again, resulting in what seems like a million little fish. This species is a live-bearer which means they give birth to live young. Once inseminated, a female guppy can store sperm in her body allowing her to get pregnant over and over without ever having to mate again. It's been known for females to be brought home to aquariums that lack any males, and still have been able to reproduce. It is really quite a remarkable trait that has set these fish apart in the industry.

Upon getting pregnant the female should be separated from the male if there was even one present to begin with. You can tell a female is pregnant because she will develop a dark spot on her belly known as the "gravid spot". Her belly will become swollen until the point where it looks like she might burst. Placing the female in a breeding tank might be beneficial at this point because this species see

fry as food rather than babies. They do not exhibit great parenting skills like some other fish do, instead the young are left to fend for themselves and hide for their lives. Breeding tanks provide protection, allowing the fry to sink down into a crevasse where they cannot be reached by the mother. Once the female is done birthing her fry it is easy to separate her out and to transfer the fry to a tank of their own. Guppies will have an average of 40 babies in each brood with an average of 7 broods or more in a life span. The gestation period lasts an average of 28 days and a female can be re-impregnated from her stored up sperm within hours of giving birth.

Newly born fry are fully capable of eating small foods and fending for themselves. Parents are no longer responsible for the care of their young once they are born so they are responsible for themselves and have to avoid danger and innately know how to survive. It takes an average of 6 weeks for sexual maturity to develop although mature males can impregnate females at a younger age. This is inadvisable so it is best to keep males separate from females. It is also recommended to separate males and females from the same parents and to keep them separate. This is to prevent inbreeding which can cause undesirable traits to occur in deformed offspring such as crippling and sterilization. To avoid these occurrences it is best to carefully place unrelated, mature guppies with one another.

Guppies are selectively bred for the different phenotype combinations that produce desirable traits in colors and fins. Guppies come in an assortment of color combinations with different colors, patterns and tail designs. They are named according to the colors of their tails and not their bodies. The combinations are seemingly endless when it comes to all the different types of guppies, which is why it is such a fascinating industry.

Different tail shapes include (but are not limited to):

- Delta tail
- Fan tail
- Double sword tail
- Top sword tail
- Bottom sword tail
- Pin tail
- Round tail
- Veil tail
- Lyre tail
- Crown tail
- Coffer tail
- Scarf tail

Different tail patterns include (but are not limited to):

- Solid color
- Small spots
- Irregular color pattern
- Large spots

The front half of the guppy's body is usually gold, grey or silver but it could also be other color variations depending on the individual. Virtually every color is represented in the décor of the guppy species from shades of primary and secondary colors to the whole spectrum in between. The colors are displayed in a multitude of patterns and combinations of patterns.

Different Patterns include (but are not limited to):

- Plain or solid color
- Tuxedo or half black
- Snake skin

Pictures





Egg Scatterers

This is another common form of the breeding method used by fish, most tetras, rainbow fish, and Rasboras use this method. To an observer this may seem a little aggressive as the male chases the female around the tank trying to encourage her to lay her eggs but very rarely does it result in any injury to the female fish. In the wild the eggs are laid all over the surroundings and swept away by the water currents but in a breeding tank the parents are mostly removed after spawning else they will certainly be tempted to eat the eggs that have just been laid. Several devices can be used to prevent this but I have always found removing the parents to be the easiest option. With the egg scatterers there are often large numbers of eggs produced at any one time, this is due to the fact that the male's sperm may not always fertilise all of the eggs successfully and the fry that make it are drastically reduced in numbers.

Examples:

Barbus Tetrazona - The Tiger barb

Barbus tetrazona is one of the most common barbus fish in aquariums. It comes from Sumatra and Borneo, that's why you can find it also under the name of "Sumatra Barb". Another common name of this fish is a "Tiger barb" due it's colour pattern, golden body with four vertical stripes, the first on the eye and the last at the begin of tail.

There are few differences between males and females, usually you are able to recognise them when they're adults, and their size is near 2 inches. Male is slimmer than the female and has red fins, edges and mouth. Females are bigger and don't have any red part.

Like other barbus, tiger barb lives in shoals. The best number of fish in shoals is five or six. More fish could end up creating two shoals fighting towards each other; while a smaller number is dangerous because they could be aggressive towards weaker fish and not create a shoal.

After captive breeding you can find various colour mutations.

- Green tiger barb has only a vertical black stripe on the eye, while the rest of the body has a dark green cover ending before the tail.
- Red tiger barb has a total red body.
- Coral red tiger barb is similar to the normal one, but the golden background colour tends to red.
- Golden tiger barb has a light yellow body colour with two white vertical stripes.
- Blushing golden tiger barb has a transparent golden body with red head.
- Albino tiger barb is mostly white.

Even if they belong to the same species, most of times barbus tetrazona of different colour don't join the same shoal. So always choose fish of the same colour to create a group.

Aquarium

The Tiger barb's behaviour is a bit nervous and aggressive within the shoal and also towards other fish, so it is better to house them in community tanks only if you have a bit of experience. They often fight to determinate the stronger one, and sometimes weaker and sick fish can be isolated. If you want a dedicated aquarium you can take at least an 18 gallons tank for 6 fish. In nature, they live both in lakes and rivers with clean water, so use a good filtration system. Since they usually swim a lot it is important to leave the central part of the aquarium almost free from plants and decorations. Barbus do not damage plants, and use to sleep

among them; so put tall plants to the sides and on the background of the tank.

They don't request specific water, anyway a light acid pH and a temperature range between 72°F and 82°F (22°C – 28°C) are preferred. Barbus usually don't suffer low temperature and some people leave them in an unheated tank, anyway this is a good solution only if your house is warm and temperature doesn't go under 68°F (20°C).

As for the ground, gravel is the best material, dark or light colour depends on your barbus colour: dark gravel for light barbus and vice versa, just remember light gravel usually needs more cleaning.

Provide a good illumination for 10 to 12 hour a day, and don't disturb them when light is switched off. Barbus tetrazona is one of few fish you are able to see when they are sleeping. They choose a part of the tank and hide and lean on plants leaves; their colours become lighter (it is easier to notice this change for a dark coloured barbus like green ones) and usually have a 45° position with head down and tail up.

In case you want to house barbus in a community tank be sure to have some experience with other fish. You have to control some parameters before housing a tiger barb shoal.

Here below, there is a list of fish and other things to avoid for a safe aquarium:

- small fish like rasbora, weaker one could end eaten.
- to leave barbus with other fish fry like young poecilia, because they will be eaten in a short time.
- long finned fish like male betta splendens and male poecilia reticulata (guppy), because barbus use to bite long fins of other fish.
- caridina japonica and other small crayfish that could be eaten during their shedding.
- sick or old fish with swimming problems, could be bitten or eaten.

The best solution for barbus is a dedicated aquarium, in case you really want to add them in a community tank, prefer big fish like: big anabantidae (i.e. trichogaster), or other species like Epalzeorhynchus bicolor, Badis badis, and Balantiocheilus melanopterus; obviously these big fish request also big aquariums.

Tiger barbs do not request particular foods, and also flakes food is fine. Remember to feed barbus when the light is switched on, they usually do not eat in the darkness. Leave food in different places so every fish will be able to eat undisturbed.

Breeding

Breeding barbus isn't really hard, but needs some time and work. Firstly, be sure to have a good number of males and females. Once they reach the adult size you will be able to notice some fish divided to pairs. Take the pair and put it in a separated tank without any gravel, with water heater to have a temperature around 77°F (25°C) and a small filter. Feed them with live or frozen food, like brine shrimp, for a week. then you should be able to see female belly more rounded. Barbus spare eggs directly on the ground so be ready to take the parents off, before they start eating the eggs and fry. Fry can be fed with small live food like infusoria, and then brine shrimp.

The bigger problem with barbus breeding is to understand the right moment. Often they breed in the tank where there are other fish, this mean all the eggs and fry end eaten.

Moreover, it is difficult to determinate the sex between the red coloured barbus, and obviously different coloured barbus will not breed, because they find their partner among the shoal.

The Neon Tetra

General information

Paracheirodon innesi of the characin family, also called 'the neon tetra' is probably the most known freshwater fish kept at home aquariums. This peaceful and schooling species does well in groups of 10 or more. You could find recommendations like 5+ tetras, 7+ tetras or whatever. However, my personal experiences say that more neon tetras equal happy fish. Therefore, it's recommended to buy a species tank with 50-100 neons. In my experience, it looks terrific. Moreover, large shoals will attract your eyes more than any TV program. Well organized tank for neon tetras means plenty of plants, a bit acidic and soft water.

Generally, neon tetras are very shy, what is noticeable if you keep only 2 or 3 of them. They come from South America's moderate sized rivers, southeast Colombia and eastern parts of Peru, where the water is usually dark-yellow or dark-brown. It makes the sense, since such rivers are full of woden pieces, plants (dead or alive). Such elements help the water to be acidic. I've seen many neon tetras in the crystal water in the shops, but they look terrific if kept in dark coloured waters. It's because their colours visualise much more.

The neon tetra is a small fish, which grows up to 4 cm (1.57 inches), looks for slowly moving waters and likes stable chemistry. There is no rule about height of the tank, so you can keep them in the shallow waters as well as deep tanks.



Temperament

Unlike peaceful neons, some larger fish may harass on small neons. Species like Angel fish or Gouramis may consider them as a kind of live food. It makes the sense, since the Angel fish usually eat Neon tetras in the wild. Basically, if you keep them together, make sure they have been kept in one tank since they were small fish. It's like cats and dogs; If you keep a baby dog with a baby cat, they will probably like each other.

Nutrition

Firstly, neon tetras are omnivores. They will eat brine shrimp, flakes, granules, frozen food, or tubifex. Feeding should be provided at least two times a day.

Breeding

In my opinion, neon tetras should be kept in the species tanks of capacity 100 Litres (26.41 US Gallons and 21.99 UK Gallons) and more. It has the simple reason; Every fish need enough space and I strictly refuse to keep them in tanks of about 15 Litres (3.96 US Gallons and 3.29 UK Gallons). A severe fish, the neon tetras need swimming areas or hiding places. Only if they're happy, they'll breed successfully. If you want to do so, you'll need a pair of them in a breeding tank. A good choice is to remove all light at first, since they usually breed during night or early day hours. Another way, how to help them to breed is to introduce some mosquito larvae into the tank. Generally, live food is the most recommended substance for any fish breeding. As soon as the eggs are laid, remove the male and the female, because they could eat the newborns. If the tank is of large size, it shouldn't be any problem to leave them in the aquarium. The eggs will hatch within 25-35 hours and they will be free-swimming in about 5 days. Feed the fry with infusoria or egg yolk. As the small fish grow switch to brine shrimp, or

shaved cattle liver. It will take about 1 month until the fry change to adult size. Once the small neons are born, they may live about 5 years at all. If kept under proper conditions, it's lifespan could be about 7 years. On the other hand, many aquarists don't follow all guidelines and the fish die of age 2 years or less.

Some other notes to breeding: Females are more rounded than males and are usually bigger than males. Breeding in captivity is possible, however you should give them enough space instead of keeping 20 neon tetras in a small tank.

Colours and diseases

The neon tetra is of dark olive-green colour combined with the silver-white and red. Usually, they lose the colours during the night hours, because the fish rest. When they become active, what is usually in the morning, the colours come back. If any fish is of poor or miserable colours, it's the attribute of some disease. Please note, that any dramatic change to their environment could cause unpredictable behaviour or diseases.

Probably the most common disease is called 'the neon tetra disease pleistophora'. This disease roots in the microsporidian parasite which enters the fish after consuming some infected material. The major symptoms are restlessness, losing the colours, swimming problems. The only 'treatment' means removing the sick fish. Diatom filter may reduce the number of parasites in the tank.

Pictures



Egg Depositors

This is my favourite group of fish for breeding. The parents will defend their eggs at all costs and I find the whole process totally fascinating. Egg depositors will either be open spawners or secretive cave spawners. In either case the spawning process begins by the parents cleaning their chosen spawning site. With open spawners this is usually a flat rock or even the tank glass, some species will even dig a pit in the substrate to use as a nest, and with the cave spawners it will be a hiding place in the tank or an artificial cave provided by the keeper. The parents will drive away any intruders once the eggs are laid and will even move the fry around in the tank to keep them safe. The parental care usually carries on for a few weeks after the hatching. Typical species that have adopted this method are Angelfish, Dwarf Cichlids, some species of catfish, and most of the larger American cichlids.

Examples:

Angelfish: Breeding

Pterophyllum Scalare is a cichlid fish that is in high demand in the aquarium industry due to their unique beauty and unusual personalities. This fish is more commonly known as the “Angelfish” and it is known to come from rivers in Peru, Columbia, and Brazil. Angelfish are unusually shaped for cichlids because they are laterally compressed with round bodies and elongated triangular-shaped dorsal and anal fins. These egg-layers form monogamous pairs and are wonderful parents in the wild as most cichlids are. Although, it has been observed through captive breeding that angels are losing their parenting instincts and tend not to care for their young as diligently as do the wild versions of themselves.

Pairing Angelfish

It is difficult to determine the sex of immature angelfish. To improve the odds of finding a suitable pair it is recommended to start with about 6 or more juvenile angelfish. Be sure to choose quality, hardy specimens with good color and finnage. This allows the spawning pair a chance to find each other naturally. A stronger bond is created among a pair of angels when they are allowed to select their own mate. Angelfish become sexually mature between 6-12 months of age. Once a pair is formed this couple will remain monogamous for the extent of their breeding capabilities. If one mate is removed it has been observed that the remaining angelfish becomes disinterested in breeding with any other mate.

Spawning

Angelfish thrive in soft water that is slightly acidic to neutral in pH between 6.5 and 7.0. Although they have become a highly adaptable species being less sensitive toward varying water conditions, the preferable water temperature is between 78-85°F. Using a heater is recommended for water temperature stability. For one pair of angels, it is recommended to have at least 20 gallons of water, 29 gallons are even better. In order to condition a pair of angels they will need to be fed high-quality foods that contain high amounts of protein. Once ready to spawn, the sex of the fish can be determined by looking at the ovipositor. The male’s ovipositor will be smaller and rounder than that of the female whose tube is wider so that the eggs may pass through. The couple will proceed to clean and prepare a surface on which the female will lay her eggs. The female lays her eggs in a line upon vertically placed rocks, leaves, pipes or logs and the male follows behind to fertilize them. A female will lay as many as 1200 eggs in a single spawning but only if she is fully mature and in good condition. A pair will spawn until they are a little over 3 years old, at which time they will lay less and less eggs until they cease to lay anymore. If the eggs are removed directly after the fertilization process the pair will proceed to spawn again in as little as a week’s time. According to some breeders a pair is capable of spawning every 7-10 days although some pairs may take up to two weeks.

Parenting

Assuming the spawning couple are wild caught angels, who still retain their parenting instincts; if the eggs are not removed from the vicinity, the parents clean the eggs removing any that aren't viable. The male and female will take turns fanning the eggs with their fins to ensure fresh water movement around the brood until they hatch. Once out of the egg the fry will survive by absorbing their yolk sacs. When the fry have completely absorbed the yolk sacs they become free-swimming and are finally ready to eat newly hatched brine shrimp, microworms or powdered fry food. The protective parents will move their fry around in order to protect them from danger.

Artificial Hatching

When angelfish are bred in captivity, they tend to not be as great parents as when they breed naturally in the wild. For this reason some breeders decide to artificially hatch angel fry by removing newly fertilized eggs and placing them in separate containers. If you choose to separate the eggs, be careful to keep your distance from the parents because they do retain their protective instincts and will not hesitate to turn their aggression towards your hands. Be careful while moving the eggs, not to keep them out of water for too long because they are quite delicate. Place them in a container of soft, dechlorinated water that is the same temperature and pH as the water you took them from. This is to keep from disturbing their development. Temperatures closer to but not exceeding 85°F will increase the amount of eggs that will hatch and softer water will contribute greatly to proper development of the embryo living within it. Harder water has more elements dissolved in it so the particles are larger and many are too large to pass through the membrane of the eggs in order to oxygenate them. Pure reverse osmosis or very soft water is ideal for hatching eggs. Another important step in hatching angel-fry artificially is to protect them from fungal and bacterial infections. This is usually the job of the angel-parents but when taking them out of the equation this duty then falls upon you. Hydrogen peroxide or methylene blue can be used to help contain these types of infections. Angelfish eggs are also light sensitive so the tint in the water from the methylene blue can also help to shield those harmful rays. Once the fry are hatched you will no longer need the treatment of hydrogen peroxide or methylene blue.

Hatchlings

After the fry have hatched out of their eggs they feed off the yolk sacs for approximately 5 days or until they are fully absorbed. Once they become free swimming they are ready to eat twice daily, meals of newly hatched baby brine shrimp, microworms, or fry powders. Be sure not to over feed them because they will eat as long as food is available to them. Be sure to complete frequent partial water changes of about 20% being careful not to siphon the tiny babies. After 3 to 4 weeks the babies take on the appearance of the angelfish that they are and will finally be ready to start eating crushed flake food. Be sure to continue feeding

them a highly nutritious diet for health reasons as well as fin and color development. Happy, healthy fish will develop gorgeous color and fins.

Phenotype

The most common color of angelfish is the silver angel, a.k.a “wild type”. This color strain is most commonly found in the wild and is the strain from which all the different colors and fin-types are bred. As this silver “wild type” are bred, dominant and recessive genes become apparent through the different color combinations and finnage exhibited by the offspring. The combination of genes inherited from the mom and dad angels can result in numerous possible strains of angelfish. A few of them are:

- Silver— silver body with 3-4 black stripes
- Gold— gold body
- Gold marble— gold body with black marble markings
- Zebra— silver body with more than 4 black stripes
- Koi—orange and white body with black marble markings
- Pearlscale—a mutation where the scales are wrinkled
- Albino—little to no dark markings on the body with pink pupils
- Blue blushing—Grey body with iridescent blue tint
- Sunset blushing—mostly white body with the upper half being orange or pink
- Veil tail—come in many colors and are characterized by their long, flowing fins

With so many different gene-pairing possibilities you never know what type of angelfish you will end up with. Some strains are more common than others and some types are hardier than others. No matter what the outcome, breeding angelfish is an interesting and fulfilling process.



The Convict Cichlid

The *Archocentrus Nigrofasciatus* is a cichlid fish that is nicknamed “convict” or “zebra” both names for its similarity to the black stripes on a British prison uniform. This fish is native to the Central American waters of Guatemala, El Salvador, Costa Rica, Honduras and Panama with temperatures ranging from 69-84°F. They are not very particular about the conditions of the water as long as you keep a certain amount of consistency. Convicts are omnivorous and they are not picky eaters. They will eat anything small enough to fit in their mouths including flake and pellet foods, small fish, crustaceans and blood worms. Although they do seem to particularly enjoy frozen beef hearts. Convict males grow to roughly 6 inches, slightly larger than the females. This is an extremely aggressive species that will take on any fish including those twice their size especially in the reproductive phase.



Sexing:

Convicts are known for their highly reproductive tendencies and it is said that they will spawn absolutely anywhere and everywhere. It is really easy to tell the females apart from the males for this particular species because of their very distinguishing differences. Females are unusually brighter in color and are more attractive than males. They tend to be smaller and rounder. Females have bright orange splotches on their bellies while their light grey stripes contrast dramatically against their black stripes. These colors become even more distinct when they are ready to spawn. The males tend to be darker grey with black stripes, have pointier pectoral, dorsal and anal fins and are generally larger than the females. Mature males develop a vestigial lump on the head much like the flower horn cichlid. The hump on the head is not useful to the fish in any way and no one really knows why it's there. Both males and females tend to develop iridescent blues, greens and yellows on their fins when they are comfortable and happy in their environments. All it takes for convicts to be happy and healthy is clean water and a well balanced cichlid diet. Once this is achieved they are ready to spawn.



Breeding:

Once a male and a female have bonded to form a monogamous pair they begin reproducing. Convict cichlids become mature enough to reproduce at a very young age. At less than 2 inches long and as little as 16 weeks of age a convict can start to spawn. Courtship takes almost no time at all before they find a spot to claim, usually in a cave or under rocks or logs. In captivity a flower pot always seems to do the trick.

I had two pairs of convicts for about a month without spawning. I introduced a flowerpot into the tank and the very next day I saw eggs scattered across the bottom. Maybe it was just a coincidence, I don't know. The new parents were so defensive that I decided to give them some privacy with their eggs by relocating the other pair to a different tank. The reproducing couple still felt the need to hide their young under piles of gravel so the male tore out every plant in the tank while digging his holes.



If you keep a close eye on a pair of convicts you'll be able to tell they are ready to spawn when the female's colors deepen as she becomes ready to lay her eggs. The male will stand guard and chase away anyone who dares to come near. One pair of convicts will take over the entire aquarium for the sake of brood care. You'll notice all the other fish cowering on one side of the aquarium as convicts are excellent parents, and extremely protective. They will hide their young if they think their babies are in danger. This is extremely impressive parenting for a fish. Once the eggs are laid and fertilized the female will take position above them and continuously fan them with her fins. It takes less than a week for the eggs to hatch and then about 3 more days for the fry to absorb their yolk sacs. This is when they become free swimmers and are ready to begin eating fry food. Fry foods can consist of newly hatched brine shrimp, live microworms, ground fish flakes or food can be bought in the form of powder. Be sure to feed fry a nutritious diet with plenty of protein because the foods they eat at this stage will influence their development into quality cichlids later.



The convict cichlid can also be found in a leucistic strain known as the pink convict, white convict or gold convict. Leucism is a condition characterized by reduced pigmentation in animals. Unlike albinism, it is caused by a reduction in all types of skin pigment, not just melanin. This strain of convict is not as easy to breed as the common zebra-striped version but they are reproduced for the sake of the aquarist industry and their breeding habits are the same. The females are whitish-pink with red splotches on their bellies and the males are just plain whitish-pink.



Convict fish are interesting to have because of their active and reproductive natures. Because of their adaptable nature they are relatively easy fish to keep. You'll enjoy watching their aggressive behavior as well as their instinctive parenting skills. Overall, convicts are great fish for all aquarists whether they are experienced or just starting out.

Egg Buriers

This group tends to be one of the less known about groups of fish breeders. Basically in the wild, the female buries the eggs under the substrate due to droughts in the area. Once the water levels drop and the substrate dries, the eggs are safely tucked away and will lie dormant until the rains raise the water level once again. The fresh water triggers the hatching and the fry emerge from the substrate perfectly safe. No parenting skills are used by this group as often the parents have a short lifespan and will have already died before the offspring emerge.

This method is replicated by fish keepers very successfully, the eggs and substrate, usually peat moss, are removed from the breeding tank and placed in a safe place out of water for 3-4 weeks before placing them back to induce the hatching. One of the most famous fish that uses this method has to be the Killifish.

Example:

KILLIFISH

The name killifish is actually derived from the Dutch word “kilde”, meaning puddle or small creek. These fish are so varied with hundreds of different species and they are very popular with aquarium keepers because of their bright coloration and markings, plus the ease with which some of the species can breed, requiring very little in special needs.

Obviously I cannot go into great detail with all of the species, so I will try to give you a general guide to keeping these beautiful fish.

They are to be found all over the world apart from Australia, Antarctica, and the Arctic. These fish are excellent jumpers so they must be kept in a tank with a tight fitting lid. Filter intakes should be covered over with a sponge as they are the perfect escape artists of the fish world.

In most cases no form of heating is required; all they need is clean water with no ammonia levels, and just the usual aquarium maintenance. In fact these fish are so hardy; they can survive in the most adverse conditions in the wild.

There are two main groups of these fish, the top dwellers, and the substrate dwellers.

Top dwellers can be recognized by their mouths being slightly upturned for surface feeding, this does not occur in the bottom feeders.

This is also reflected in their breeding habits. Some species will lay their eggs at the surface in either floating plants or bubble nests, while the substrate dwellers will deposit their eggs in the sand or use plants, rocks etc.

Some species are pure freshwater, some are brackish fish; this is how diverse they are

Their temperament cannot be guaranteed, some of the species will shoal together, while others will behave very territorially to other tank members.

There are some common genres that are sold on a regular basis so I will try to provide an insight into these.



APHYOSEMION

Normally these are brightly colored fish with colorful tails. Most of this species are non-aggressive so they could even be added to a community set up. This genus can be quite timid so floating plants provide some hiding places if they need them, only keep them with non-aggressive tank mates. These will generally accept any food offered to them, but live foods are required to give them a healthy diet.

They will lay their eggs in the plants, normal hatching time is 2 to 3 weeks.

NOTHOBRANCHIUS

This genus tends to be very brightly colored, in some cases even more so than the Aphyosemion, so they are readily bought on sight by eager keepers. Their body shape tends to be plumper and more rounded with shorter fins. This genus should be kept in a species tank with slightly brackish conditions. Live food is a must as they will refuse flake or pellet foods. They are peat spawners, normally laying their eggs in a muddy substrate which in their natural habitat will dry out in the dry season. The eggs can survive in this state until the rainy season starts again, the eggs will then hatch as the lakes refill with water.

CYNOLEBIAS

This genus is another bottom dweller, laying their eggs in the substrate or peat moss. They are to be found in South America, and they tend to be a bit drabber than the African varieties. Their body is a long narrow one, normally with longer, flowing fins. Live food is also a must for these fish, so if you are serious about

keeping killifish then culturing your own food could be to your own advantage. Floating plants would be a good idea with these as they are more timid than most of the other killifish.

APLOCHEILUS

Originating mainly in Asia, these are top dwellers and feeders. Because of this they are excellent jumpers, looking for food in the wild and actually jumping out of the water to catch it. This genus is probably one of the easiest to keep as regards water quality etc., also readily eating any food offered to them, live or flake. As expected these are plant spawners, so provide them with some in the aquarium. One great feature of these fish is a light sensitive organ situated on the top of their heads. This is used in nature to warn of any predators approaching as they are feeding.

As mentioned earlier, breeding of these fish is quite easy compared to other species of fish that many breeders get results with. Starting with the top dwellers, set up a small tank, then create a mop for them to lay their eggs in. This is done quite easily by wrapping some yarn around a length of cardboard, tying it off, then slicing the ends. Remember the pompoms we used to make as kids exactly the same principle. Only use yarn with a green or brown dye and make sure the dye is fast (will not leach into the water). Attach a cork to make it float, then place in the tank. Your killifish should readily lay eggs in it, once they have simply remove the mop into another tank and wait for the eggs to hatch. Once hatched, the fry can be fed on newly hatched brine shrimp or infusoria. As the fry grow they will need moving into a larger growing on tank.

For the peat moss spawners, again use a smallish tank, add some boiled peat moss. If eggs haven't been laid after a couple of weeks, repeat the process of adding freshly boiled peat moss. Once the eggs have been laid, simply remove the peat moss, sieve the water out, then place the peat moss and eggs into a plastic bag, which should be rolled up to make it compact. Date the day the eggs were bagged so that you will know when to add them back to the water. This varies between the different killifish, so research your species. When the time comes, place them in a plastic tub, then add water, salt and some fungicidal medication (just in case). In a matter of hours the eggs should start hatching.

Nest Builders

Nest building fish are very popular amongst fish keepers and it is fascinating to watch the fish create their work of art. The most famous fish that belongs to this group has to be the Siamese fighting fish but there are many species of Betta that have adopted this method for reproducing. There are even several species of catfish that will perform this act in the wild but as yet we have not managed to persuade them to do it in an aquarium.

The male will produce his nest by creating saliva coated bubbles at the water surface; this is aided by adding plants to the tank to give the bubbles something to latch onto. He will show off his nest to the female and nudge her in there where she will lay her eggs ready for the male to fertilise. In most cases, the male will then drive the female away and tend the nest himself.

Examples:

Siamese Fighting Fish (Betta Splendens)

Introduction

Siamese Fighting Fish are one of the most popular and beautiful aquarium fish available. They come in a wide range of colours and the male of the species have long flowing fins. They are also capable of surviving in many different conditions. Many were once sold in a vase with a lily in the top, and you still see them kept in cups and small jars. This is far from ideal for the Siamese Fighting Fish, although they will tolerate these conditions indefinitely, but it doesn't mean to say they are happy! I never recommend keeping any fish in less than 2 gallons of water, which should either be filtered or changed regularly and I abhor the practice of "Jarring", keeping them in 1-2 pints (1/2 – 1 litre) of water.

The name Siamese Fighting Fish came from when they were first used by gamblers in the Far East. They would put two males together and watch them fight, often to the death of one, for money. Splendens are one of a few species of male fish that will not tolerate any other males in their vicinity. The origins of their aggression are unknown, but it is believed by some to be a natural territorial behaviour. However, through persistent captive breeding, this aggression has been increased to an un-natural level.

Origin

Siamese Fighting Fish originate from the paddy fields, gullies and streams of South East Asia, and are found mainly in Thailand, Borneo and South Vietnam. They thrive in stagnant ponds and slow-moving water. Because of their Labyrinth, a special "lung", they can survive in water with very little oxygen by coming to the surface periodically to breathe. In fact, they have been known to drown if they cannot get to the surface!

Aquarium

They need warm water, between 75°F (24°C) and 84°F (29°C), but can tolerate a wide range of water hardness (pH), anywhere between 6 and 8. The tank should also have a tight-fitting cover, as Siamese Fighting Fish are excellent jumpers and will often die through jumping out of the water onto the counter. Another reason

for the tight lid is to keep the air temperature as close as possible to the water temperature, so that they don't catch pneumonia by breathing cold air.

All pictures were provided by Laura M. Schlögl.



Most people would recommend that these males are solitary fish, kept in tanks on their own, and in most cases, this is wise. They can be kept in communities though, with other fish species, so long as care is taken to ensure that there are no small fry, fin-nippers, similar looking fish such as fancy guppies, other male splendens or very fast fish in the tank with the Siamese Fighting Fish. You can keep them with betta females, as long as there are several females. These fish are slow movers, (except when stalking or mating), and very susceptible to damage not only from other tank mates, but also from sharp objects or corners on ornaments. Similar looking fish, like the fancy guppy could be mistaken as competition and create problems for you too.

The tank should be well equipped with hiding places, plants, rocks or ornaments, as these fish like to hide and hunt. Live food such as blood worms, cut up earth worms, baby brine shrimp and daphnia are very quickly consumed, and the diet should also include vegetables such as crushed peas, sliced cucumber or aubergine.

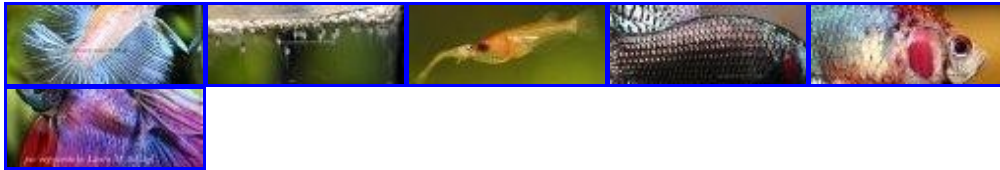
Temperament and breeding

Not all Siamese Fighting Fish are super-aggressive. Much depends on the way they are bred. If they are bred in a community the aggression is much less than if they are bred in separate jars. The aggression factor is further increased if they are not allowed to see any other Siamese Fighting Fish while growing to adult. "Carding", (placing card between each jar to obscure the view of other fish), is very common amongst breeders of Siamese Fighting Fish for this very purpose, although many breeders will give the excuse that by constantly "flaring" at each other, they get tired. (Flaring is the term used to describe the spreading of gill covers and fins in a display of aggression.)

Personally I have successfully bred splendens in a community with very little sign of trouble. I consider this to be successful if they can co-exist as a community until 6 months old, when the males are very noticeable. As juveniles, they will flare at each other, but I have not had any fatalities or even serious aggression displayed. Usually one of the males will quickly submit and swim away, doing a

headstand to show his submission. Once this happens, the winning male flares and swims away too. At 6 months old, I take the males out and give them their own space, but still allow them to see other Siamese Fighting Fish.

Females of the species are usually much more placid, and don't carry nearly as much finnage. They can exist happily in a community indefinitely, either in groups of 6 or more females, or with one male and a group of females. As with all things, there are exceptions to the rule, so this is something that you need to watch for when putting several Siamese Fighting Fish females together.



Although these are easy fish to breed, it is unwise to do so unless you have the ability to cope with the offspring. Siamese Fighting Fish are “Bubble-nesters”, which means that they build a nest of saliva covered air bubbles on the surface of the water or under a large leaf or similar, and when they mate, the male will catch the eggs from the female and blow them into the nest.

If you do intend to breed these fish, you need to ensure that you have enough tanks and equipment to cope with both adults and fry. The breeding tank should be no less than 15 gallons and large enough to allow the female to escape from the male. It should be furnished with lots of hiding places, plants large leaves, rocks etc and have either floating plants or a polystyrene cup, cut in half, floating on the water. The temperature needs to be 80°F (27°C) and filtering should be by air using a sponge filter. During mating, the filter should be turned off. Almond leaves, extract or Betta Spa will all aid in the mating process.

Mating

Mating is often a very drawn out process, and can take several hours, but is beautiful to watch. The male will build the nest, entice the female under it and then they go into an embrace, the male wrapping himself around the female while she releases some eggs. He fertilises them as she releases and then lets her go while he chases the eggs, collects them up and blows them into the nest. The female will appear stunned for several seconds after each embrace, then once she recovers, goes straight back to the male and the process is repeated until all the eggs are released. This can be up to 400 eggs.

Once mating has finished, the male will chase the female away from the nesting site and this is a good time to remove her to a recovery tank. The male will attend the nest and subsequent fry for the first 5-7 days, during which time he will not

eat. He needs to be removed too after this time, or he may see the fry as food!

It is most important that the breeding tank has a tight fitting lid at all times while the fry are growing, since they are extremely delicate and will succumb to pneumonia very easily. Most fry are lost during the early stages of development because of this.

The fry

The fry are free-swimming by day 6, and will only be able to eat very small foods, such as fresh baby brine shrimp or infusoria for the first 4 weeks. (You need to setup a hatchery for BBS that can maintain an adequate supply daily.) After this time you can start to introduce finely ground flake food as a supplement to the BBS, and gradually wean them off the brine shrimp by week 10. By now you should be able to tell males from females and need to watch for aggressive males and remove to separate breeding tanks if necessary. It is quite possible that you could have 100 males from a single sporn, so you need to be able to make arrangements for their separation should it be required.

By week 16, they are normally large enough to sell on to your local store or friends. If you plan to keep them yourself, invest in a lot of tanks now!



Breeding Betta Fish

After live bearing fishes, betta splendens is one of the easiest fish to breed in captivity even for newbies. Following some easy rules you'll be able to have a successful breeding.

There's not the best method to breed bettas, most of breeders due to personal experience have found the best ways for them. Spawning is not difficult, and the hardest part is fry growing, at least the first days. Surely the first time you may experience a high mortality due to water pollution depending by overfeeding. Remember, bettas can be bred various times if they're young so you can have various chances to improve your abilities.

First of all you have to choose the two breeders. Both have to be healthy, fins condition tells a lot about bettas' health, a betta with damaged fins could have

fought and now have low energies to mate. Betta have a short life so it's important to choose young fish, about 5 months old, usually those you may find in shops are of that age, while if you're getting them by a breeder simply ask information. Age is important specially for females, usually a old female doesn't produce eggs and or is too weak to bear the male.

Take a look also to the colours of breeders, some varieties are most wanted and you could find easier a new house to the born fish. Multicolour bettas are the most common, and even if some of them are really beautiful they're not considered to breed. No matter what variety you choose, except for multicolour bettas, the male and the female should be of the same colour.

Even if in mating you need only one female, get some more and make them live with the male for a bit. You'll be able to notice if he has some preferences on a special one.

Before breeding you need to get some material you will need during the process. It's better to test everything before mating, to be sure everything will work when you need.

- 1) A small tank (about 5 gallons or bigger). Think fry will stay there for more than a month so always have one or two other tanks, in case of unexpected number of babies.
- 2) Some plants to let female hide during mating and to make the nest more solid. Even if real plants can oxygenate water, often they can't live without ground substrate, so you risk to have dead plants polluting water; moreover often small tanks don't have light system. For those reasons, plastic plants are better.
- 3) A water oxygenator. It is better than a filter because can keep the water a bit clean without damaging the fry. Remember to switch it on only when fry can swim and not when they still are in the nest or it risks to destroy the entire bubble nest.
- 4) A water heater set at 80° F (27° C). In case you do not want to buy one, or your is too big for the tank, try mating during hot periods, like summer.
- 5) Live brine shrimps are the first fry food. They are not so difficult to hatch, but you need some materials like other oxygenator, heater and tanks, so it's better to buy a hatching kit. Usually they don't cost too much and allow you to have a huge number of newborn brine shrimps ready for fry.

A week before mating start feeding fish twice a day with rich foods. In case you already have adult brine shrimps, you can use them to feed bettas. Otherwise you can use other fresh or frozen foods. In these days you should be able to see the

female's belly growing and ovipositor more pronounced, these are connected with egg production, while the male should be building the bubble nest (often males build nests even if there aren't females in the aquarium).

In the meanwhile you can prepare the spawning tank. There's no need for special conditioned water, just remember to set the temperature to 80°F (27°C) and to set a shallow water. Avoid any kind of substrate, or ground cleaning will be impossible. Put plants long enough to reach the water surface. Put the oxygenator switched off.

After a week of rich feeding you can take bettas and house them in the spawning tank. Some breeders use to leave some days male and female separated in two aquariums to let them see and study each other without contacts; this can be useful if the male is too aggressive and the female isn't ready yet.

During the first day together the male builds the bubble nest, then starts his courtship. This can go on for one or two days, during this period female may receive some bites specially on the fins, usually they are not a problem. If in three days nothing happens take off the female and put in another tank near male's, and feed them with rich foods again for two or three days. If nothing happens again maybe one of the two is too old or not in a good shape.

Most of time everything goes fine and bettas get into their peculiar embrace, egg fertilization is external, they usually can spawn from 50 to 1000 eggs that hatch after 2-3 days. When spawning finishes the male collects the eggs and put them in the bubble nest. Females have different behaviours they can collect, ignore or eat, anyway you can take her off to be sure and let her rest.

During the first 4-5 days the male takes care of eggs and fry putting them again in the nest in case of fall, and re-building the destroyed parts of nest. In this period the betta male is really overprotective and aggressive so don't keep other fish neither the female with him. Sometimes also females take care of eggs and fry if the male is weak or not present.

About 3 days after hatching the fry start swimming, so you can remove the male, because he may loose interest and even eat them. If fry are able to swim well this means that they have absorbed the egg sack, so are ready to eat twice a day. and since they no longer need the nest you can switch on the oxygenator.

Betta fry are really small and for the first days feed them is really hard because they eat only live food. Most of them eat easily just hatched brine shrimps, in case you see babies too small or want to try other food also infusoria or vinegar eels are a good starting food.

Some people also try dry or liquid food, but it doesn't work well for the first days.

Betta fry are really shy and don't go searching for food but eat everything that moves in front of their mouths, that's why live food is better. You can try putting dry food mixed with the water in a small syringe without needle, and spray it directly on the fry. Remember also that even if dry food is easier to prepare, it doesn't have the same nutrition power of live food so fry will grow slowly and sometimes die.

Fry really suffer water pollution, overfeeding and filter absence can develop it fast. Even if some people suggest not to change water, it's better to make careful daily water change with a small syringe.

During growing you may notice some fry growing less than other, it's quite normal some of them will die. Take a look if you see too much fry in the aquarium, divide them in various tanks. Use a cup or a glass to move them with the water, don't use a net.

When fry are two weeks old you can plan better water changes and add a slow filter at the place of the oxygenator. For the first month is better feeding bettas with live food, then you can add also frozen and dry foods, anyway remember that the more the food is rich the more bettas grow fast.

At 40-50 days old you can decide to move them into bigger aquariums, in this period you could see the first fights of males, those aren't real fights yet, just a training like a lot of young animals do. In case you see a stronger fish that hurts other is better to put it in another aquarium; if it can eat easily you can house it in a community tank as well. At this time you can also decide to sell or give them away.

Mouth Brooders

Mouth brooders have certainly developed a unique method of protecting their offspring right from when the eggs are laid. The eggs are laid in a shallow pit in the substrate, often near a rock pile, and when the male has fertilised them, the female scoops them up into her mouth for brooding. Some of the mouth brooding species have taken this one step further where the male will actually fertilise the eggs inside the female's mouth. IN some of the species the female will spit out the eggs she has picked up so that the male can carry on with the brooding without any help from her, this is common in the mouth brooding Betta. Even after the eggs have hatched, the fry will be kept in the mouth and released for short periods of time initially.

Examples:

African Cichlids

African Cichlids come from three of Africa's great lakes - Malawi, Tanganyika, and Victoria. In these lakes there are more species of fish than in any other lakes in the world. We don't know the exact number of species and new ones are being continually discovered in all the lakes, so you can understand how difficult it is to count them. Cichlid fishes in these lakes often have extraordinary opportunities to instigate speciation, an evolutionary process that leads to differences. That is why they are the most spectacular examples of speciation and adaptive radiation within any vertebrate family. The process is what makes Africa's great lakes, and the cichlids that inhabit them, so interesting.

African cichlids are beautifully coloured freshwater aquarium fish. They have amazing social behaviour, display extroverted personalities, and are intelligent too. It is easy to care for cichlids, and they will bring a great deal of pleasure to the aquarium enthusiast if you take good care of them.

This fish is territorial and it can be hostile towards other cichlids. Most often the largest cichlid is the dominant one and will behave aggressively towards other fish in aquarium - especially during breeding and spawning. The smallest cichlid is sometimes attacked and killed by the larger.

African Cichlids have aggressive behaviour so their tank should be as large as possible. A long tank is the best choice. In the aquarium should be a rock structure with caves and platforms, but with an open area for swimming. Light can be any colour you like. The water in African lakes is different from other biotopes and looks more like marine than tropical fresh water. Because of their high pH and hardness levels it is necessary to treat the water with some sort of African Cichlid lake salts. Try to ask in your aqua shop.

African Cichlids breed like this: the female comes into the territory of a courting male and lays eggs. She immediately picks them up into her mouth and there they are fecundated. Her newborns stay in her mouth until it can no longer accommodate the growing fries. During this time the female usually does not eat. But a few clever cichlid females are released from maternal (paternal - father, maternal - mother) care by unusual coexistence with a fish 100 times bigger. The cichlid and catfish have their young in one place and they defend them collectively.

Their food should be rich in vegetation. African cichlids should be fed by supplements of peas, romaine lettuce, spinach, and zucchini which is cut into small pieces. You can also buy flakes and algae disks. African Cichlids, especially from Lake Malawi, also eat all available sources of food including phytoplankton, zooplankton, soft bottom deposits, algae on the surface of rocks, algae that grow upon other submerged plants, higher plants, molluscs, insects and

benthic arthropods, fish scales, fish fins, fishes, and fish eggs, embryos, and larvae. Food especially made for the needs of cichlids is available in most pet stores.

List of species

Here are listed just some species.

- 1) Altolamprologus compressiceps (Compressed cichlid)
- 2) Anomalochromis thomasi (African butterfly cichlid)
- 3) Aulonocara jacobfreibergi (Lake malawi butterfly cichlid)
- 4) Aulonocara stuartgranti (Grants peacock cichlid)
- 5) Cyphotilapia frontosa (Frontosa cichlid)
- 6) Cyprichromis leptosoma (Slender cichlid)
- 7) Haplochromis chilotes (Victoria biglip hap cichlid)
- 8) Hemichromis bimaculatus (Jewel cichlid)
- 9) Hemichromis lifalili (Lifalili cichlid)

*Please, check the article named **MALAWI CICHLIDS** which is placed in the chapters above, too.*

As with most things the breeding of the fish doesn't always run smoothly, there are many things that can go wrong, some of the livebearers will eat their young as they are born, many of the egg depositors will eat their eggs on the first few batches that they lay. This is all part of the challenge of fish breeding and most problems can be overcome with patience and care.

12. Specialised Equipment and Upgrades

When the tank is up and running it will probably be using basic equipment initially, sometimes this pushes the tank to the limit of what it can hold so it is well worthwhile looking around to see how we can upgrade our equipment or even add specialised equipment to make our life easier as regards keeping the tank in top condition. There are many items available to purchase, some are relatively inexpensive and some can cost quite a lot of money, I have always found the best plan is to upgrade one item at a time rather than paying out for everything in one go.

Below I will list a few of the items that I tend to upgrade on a tank set up, some are necessary to make the tank run smoothly but some are just items that I like to upgrade as a long term investment. I know that they will be useful for future set ups that I have in mind.

The first item I always look to upgrade is one of the pieces of equipment that often gets overlooked. When you first start fish keeping you are probably using a strip thermometer or a glass one that attaches to the tank by means of a sucker. I prefer to pay a little bit more money and invest in a good digital thermometer. They are easy to read and are far more accurate than the conventional ones. Most of the digital models will have a separate probe that can be placed anywhere in the tank and some will even display readouts in Centigrade or Fahrenheit.

At aqua-fish.net there is an article covering this topic:

DIGITAL AQUARIUM THERMOMETERS

Temperature inside your aquarium is something that needs to be checked on a daily basis. It is crucial to your fish's health that they are kept in an environment that is best suited for them.

Most fish and invertebrates are cold blooded, they can only maintain their body heat from the environment that they are living in; incorrect temperatures can affect their metabolism in all sorts of ways. Large changes in the temperature are not a good thing in any aquarium. When I perform water changes in my tanks I always preheat the water that is going in, not all keepers do this, so checking the temperature for sudden drops as they refill the tank is vital. Make sure the water is added back slowly, giving it time to reheat this is the only way around this problem.

Incorrect temperatures can cause the following problems:-

- Illness caused by stress

- Death brought on by stress
- Reduction in the appetite of the fish, this in turn will reduce the capability of their immune system.

Every aquarium must have a thermometer fitted, most fish require a temperature of 75°F – 80°F (24°C-27°C), however some species will require higher or lower temperatures to live happily, always research the fish before you buy.

Most of the original thermometers were alcohol, glass ones. Simply they worked by the alcohol expanding with heat and rising up the tube from a storage bulb at the bottom, a simple gauge at the front of the thermometer is all that is required for a reading. These were attached to the aquarium by means of a sucker arrangement.

Digital strip thermometers were the next step; they were attached by actually sticking them to the front of the aquarium on the outside by means of a sticky backing. As the temperature increased the scale on the strip would illuminate with assorted colors, depending on the make, a reading is then available from a further distance as the strips stand out more than the internal glass thermometers.

Disadvantages of using the glass thermometers are that you need to be right in front of the aquarium to get a reading; the digital strip allows you to get a reading from further away. The glass thermometers, after a period of time tend to get a coating of algae, because of this they need to be removed for cleaning.

Disadvantage of the digital strip thermometers - how accurate are they?

The temperature is measured from outside of the tank, this means that the heat has to travel through the glass before a reading can be taken, also they can absorb some heat from external surroundings.

Nowadays there is a new range of digital thermometer available. Most of these are battery operated with a clear crystal display; this means that reading the temperatures is as easy as a quick glance at the aquarium.

Many are fitted with a probe that sits in the water; this can give an accuracy of plus or minus of 0.5 of a degree, these can be relied on much more in my opinion.

I currently run two thermometers one at each end of my tank, (temperatures can vary if the water flow is not correct.), they are mounted on the outside of the tank by means of a velcro arrangement, the probes are then placed in the water, suckers securing them.

The display can be either Fahrenheit or Centigrade, whichever is preferred. Battery life in them is well over one year or 5000 hours constant use. I can literally walk into the room containing the aquarium and with a quick glance make a note of the water temperature, much better than peering into the tank glass trying to get a reading.

There are some models that are completely submersible, these sit inside the tank also and are mounted by means of a sucker arrangement. The advantage to these is that there are no wires hanging from the thermometer for the fish or plants to get tangled in, everything is self contained, this is much better for the aesthetics of the tank. Another advantage of this type of thermometer is that it will display the temperature down to one tenth of a degree, how accurate is that reading.

Yet another design adaptation to this type of thermometer is the floating design. It literally floats on the water surface giving readings all of the time, usually a clip is attached incase the fish keeper wants to secure it on the side of the tank. As it is a floating design other uses for it are in swimming pools and hot spas so these are very versatile. If it is accidentally dropped in the tank, no problem, it will simply float to the water surface again.

The prices for the glass and digital strip thermometers are definitely at the cheaper end of the market, normally you would expect to pay no more than 2 pounds (4 dollars) for these items, but for piece of mind paying out slightly more for a more accurate model makes sense to me.

We are not talking a lot of money here, a basic digital thermometer with display screen and wired probe costs as little as 5 pounds (10 dollars) up to 10 pounds (20 dollars) depending on which model you decide to purchase.

There are a lot of these coming over from Hong Kong at the moment, very reasonably priced, with as much reliability as the well known makes, just check the postage before ordering.

For slightly more money, these can be purchased with added features.

- Large display – this is very useful for people with poor sight quality, or if viewing from a larger distance.
- Aquarium temperature display plus room temp display – sometimes the room temperature can have a detrimental effect on the tank temperatures if too high. In this case a cooling fan would help out.
- A built in alarm for out of range temperatures – the temperatures can be set so that if they drop below a certain level or above a certain level an audible alarm will ring out, warning the fish keeper.

To benefit from these extra features it will still only cost you anywhere from 15 pounds (30 dollars) up to 25 pounds (50 dollars), depending on the model you choose.

Accurate measurement of aquarium temperatures is a must, not just done for fun; your fish depend on them being right, always buy the best model you can afford.

Heaters are a vital piece of equipment; if they fail they can wipe out the whole tank as the temperature either rises or drops. Many aquarium kits will provide a basic heater but their life span tends to be fairly short. Spending a bit more money on a reliable brand name will certainly pay dividends plus they will give you piece of mind as you know they will not let you down.

I even went one step further with my display tank and added a Titanium heater, virtually impossible to break and even if the water level drops below the heater, they will simply sound an alarm and click off rather than the glass shattering, adding fragments all over your tank.

At aqua-fish.net there are articles covering this topic:

*See the article named **Aquarium heaters** in the chapters above, please.*

TITANIUM AQUARIUM HEATERS

As most of us know there are a wide variety of submersible aquarium heaters available to buy, normally aquarists will purchase the standard units where the heating element is enclosed in a glass or plastic case. Another option on the market that is now widely available is the submersible titanium heater.

Standard heaters are more in the price range of most people, but they do have their disadvantages. They have to be submerged to the recommended water level (normally there is a line on the glass tube to act as an indicator), if the water drops below that the tube can blow, or at least overheat, this could mean a premature death for your fish, and it will definitely kill off the heater.

- Remembering to turn off the heater before removing it from the aquarium is often overlooked; I have done it myself on numerous occasions.
- After constant use a build up of scale can accumulate on the heater, not only is this unsightly, it can lead to total failure of the heater.

- Some of the cheaper heaters can sometimes be made to fairly low standards; this will reduce the lifespan of the heater to months rather than years.
- In salt water setups the heater will corrode at a quicker rate than tropical set ups, especially on plastic sheathed heaters, yet again the life span will be reduced.
- Temperature fluctuations can alter the specific gravity, and the ability of the water to absorb oxygen, this will induce stress related illnesses to your fish so it makes sense to have a reliable, high quality heater in your aquarium.

As the heating device in the aquariums is a vital piece of equipment, upgrading your heaters to the titanium models could be a good move, titanium heaters are widely used in ponds and have proved their worth, so why not introduce them to your tank. Titanium heaters are virtually unbreakable, they will not shatter if they are knocked while the element is hot, but if they are dropped from a height then they can break up.

There is no glass being introduced inside the aquarium, the outer casing is completely metallic, this reduces another hazard from the fish. The heat radiation is far superior to standard submersible heaters, plus there is less oxidation on the immersed casing, this means that there will be less corrosion occurring, especially in salt water set ups. Most of the standard submersibles will only be produced up to 400 watts; titanium heaters can go up to 800 watts, because of this the larger aquariums that have been running two heaters would only need to run one.

The main disadvantage has to be the price you will have to pay to purchase one of these, short term it may seem a lot, but in the long term it will end up cutting your running costs eventually. The price of the titanium heating probe compares with standard models but most of the titanium heaters will require a separate thermostat control, this is where the extra cost comes into it.

The controllers are not difficult to use, they have been designed to be very user friendly.

Many will have led displays that are very easy to read and the controllers will often monitor any temperature fluctuations that occur over a 24 hour period. The heating elements are constructed from titanium and include top quality components to give precise temperature control, and as mentioned above in the controllers there will be a built in sensor that will cut the power if the element is exposed to air while it is still plugged in. Once the element is back in the water, and has cooled down, the power will be restored to carry on with normal operation.

- Finnex produce a range of titanium heating tubes priced at approx. 17 pounds (34 dollars) for the 300 watt version, prices then rise to approx. 25 pounds (50 dollars) for the 800 watt version. These tubes are compatible with different makes of controllers; always ask that they are compatible with the controller you are going to buy. This company do market their own controller which is priced at approx. 15 pounds (30 dollars), but it is a basic unit but it does the job. It can be used with the 300, 500, and 800 watt heating tubes. They simply plug into the controller and setting the required temperature range is achieved by means of a dial on the front. With this controller there is no display screen for fast viewing.
- Aqua medic also produce a range of controllers that are compatible with the finnex heating tubes, these are a bit pricier but are of a higher quality, along with added features. It has a twin display unit for fast viewing so that maximum and minimum temperatures can be noted. All temperatures are set by means of touch sensitive pads on the front, giving more control for accuracy. Price wise a controller for a 300 watt heater will cost you 45 pounds (90 dollars), and the highest rated controller for a 800 watt heater will be on the market for approx. 60 pounds (120 dollars). This does seem a lot of money, but for piece of mind I reckon they are worth every penny.
- Aqua heat do an all in one unit which you can purchase for approx. 14 pounds (28 dollars), the only drawback with these is that they are only available in 200 or 300 watt versions. Temperature control is set by means of a small dial on the front of the unit, but they are sold with a year's warranty.

We must remember that when setting the temperatures required for our aquariums, the lighting units above the tanks can affect the water as larger lighting systems or metal halide lighting does give off a lot of heat when in use. This should be taken into account.

Always check which size of heating tube you will need to run for the size of your aquarium, the larger the water volume, the larger the heater required.

SUBMERSIBLE AQUARIUM HEATERS

We all know how important it is to have a good quality filtration system in our aquariums, but one piece of equipment that a lot of fish keepers tend to neglect is the heater that we use in our tanks. To me this is just as important as the filtration and cutting corners by trying to save pennies does not pay in this case.

Our livestock depend on us to give them the correct temperatures to live in, they are cold blooded so the only way that they can get any heat into their bodies is through the tank water.

In the early days of fish keeping immersible heaters were available, these hung on the back of the tank with the heating probe in the water, and the thermostat was a separate unit that was kept over the tank in the dry. For this reason they are commonly known as hang on heaters, but nowadays these have been replaced with a new range of heating equipment, the fully submersible heater.

The whole unit is placed in the water, the heating element and thermostat are built into the unit, and this means that the only piece out of the water is the wire for connection to the mains.

There are several manufacturers producing this piece of equipment and we shall look at some of these further on in this article.

The temperature levels are set by means of a knob on top of the heater, the higher quality models will also have a scale on the side, and this will then tell the user the temperature that the heater has been set to.

All of the heaters are sold by the wattage that they run at, the larger the aquarium, the higher the wattage required to heat the water, in some cases with the larger tanks it is quite common to have a heater placed at both ends to ensure that a constant temperature is maintained throughout.

Most submersibles are enclosed in a glass tube, because of this they will break if knocked, some models claim to be shatter proof but I would not like to put them to the test. If you do break the glass never try to repair it, always invest in a new unit, if your repair fails you will be mixing electricity with water, definitely not a good idea.

How do I know which heater to buy:-

Always go for the best quality you can afford, check the extra features that the heater is advertised as giving you. The wattage required will depend on the size of your tank, below is a rough guide as to which you will need, if you are unsure always ask for advise.

Wattage	Litres	UK Gallons
50W	20-50L	4.5-11 UK Gall
100W	50-100L	11-22 UK Gall
200W	100-200L	22-44 UK Gall
300W	200-300L	44-66 UK Gall
400W	300-400L	66-88 UK Gall

If running a larger tank then a combination of the two will ensure a constant temperature

Placement of the heater (s):-

Bit of an obvious statement but believe me, if have seen some very strange placement of heaters in some tanks. Always try to place your heater near flowing water, next to the outlet from your filter is ideal, this will ensure the heat will be dispersed throughout the tank.

I prefer to have my heaters mounted at a 45 deg angle on the back of the tank as I think the heat radiation is more efficient, having said that I know a few fish keepers that place them in a horizontal position for the aesthetics of the tank.

- Always purchase a quality thermometer to monitor the heater.
- If possible keep a spare heater to one side in case of emergencies.
- In new set ups, run the heater for 24 hours to make sure that it is set to the correct temperatures, if it is set to a certain temperature on the heater scale it may vary in the water, in this case a bit of fine adjustment up or down will be required.
- Never remove the heater from the water if switched on, it will blow the glass and could cause injury to you.
- If you need to remove the heater for tank maintenance, switch it off 10 minutes prior to removal, this will allow the heater to cool down.

As mentioned previously there are a lot of well known brands on the market, they all do the job they are supposed to, but some have better qualities than others ,hopefully this short guide will give you some ideas as to which types to choose, but please bear in mind, this is my personal opinion, other people may have different preferences.

Jewel Heaters:-

These heaters are supplied with their tank set ups and range from 50 watts to 300 watts. They are available to buy separately for approx. 20 pounds (40 dollars) depending on where you buy.

The glass casing with these is quite strong but what you see is what you get, no fancy extras but they are reliable. The only drawback I have found with these is that they do not come with a scale for temperature setting. The adjustment knob is on the top and the only indication for the adjustment is a plus and minus sign, this

means that obtaining the correct setting is very much trial and error. Once set though, they will run with no problems.

Visitherm heaters:-

This is a very well constructed heater, it comes as standard with a temperature dial on top, this is definitely a bonus when re-adjusting the settings while the heater is situated in the tank. There is a large scale that can be read easily on the side of the glass, this can confirm which temperature has been selected. Visitherm is produced by marineland who also produce the stealth range of heaters. The great benefit of the stealth range is the plastic casing that is used rather than glass. This makes it virtually unbreakable but all the visible scales are also included. Both ranges are available from 25 watts up to 300 watts and price wise there is not a lot of difference between the two. The 25 watt models sells for approx. 8 pounds (16 dollars), the 300 watt model sells at approx. 10 pounds (20 dollars).

I think these are good value for money.

Rena heaters:-

This has to be my favorite brand of heaters. The Rena cal series was well ahead of some of its competitors when it first arrived on the scene. The units are triple sealed for extra protection, plus the glass is 2mm thick for extra strength. Setting the temp is easy with a well graduated control knob and visible scale. The main benefit with these is the fact that the heating coil heats the glass case directly so that the heat is much quicker entering the water. Other models heat the air encased in the glass, making them less efficient. It incorporates a solid silver thermostat contact that can react to changes in the water temperature very quickly. Prices range from 10 pounds (20 dollars) for a 50 watt version, up to 15 pounds (30 dollars) for the 200 watt version.

Rena also went one step further with their designs and produced the Rena smart heaters.

These heaters are supplied in a stylish but strong plastic casing. They have a built in electronic sensor which will alert the aquarist if the temp drifts 3 degrees out of range above or below. This is done by means of a warning light that will flash repeatedly. The other great advantage of this model is that it will automatically switch off when it is not totally submerged in water.

All of these extras do add money to the price, but well worth it in my opinion. 50 watt models sell for 25 pounds (50 dollars), 300 watt models sell for 30 pounds (60 dollars).

There are many more heaters on the market but that was a list of my three favorites.

Aquarium lighting tends to be one of the most popular pieces of equipment that is upgraded by many keepers, it may be necessary for planted tanks as the lighting supplied isn't strong enough or some people just think the tank isn't bright enough for their own liking. The basic lighting unit consists of standard fluorescent tubes or T8's nowadays, for planted tanks T5 lighting units are much more powerful and help the plants to grow a lot quicker. Many of the units can be purchased to fit exactly into the tank as they are the same size as the old unit or you can even purchase units that sit on top of the tank by means of brackets. The lighting units do vary in price a great deal but if you shop around you are sure to find one that fits your budget.

At aqua-fish.net there are articles covering this topic:

*See the article named **LIGHTING FOR AQUARIUM PLANTS** in the other chapters, please.*

T5 aquarium lights

To buy a T5 aquarium lighting, simply follow this link. If you need information firstly, then go through this page... To get the best from your aquarium, you need to make sure that the lighting you install provides the maximum results. Lighting which does not suit the application or is insufficient in strength will in time depress the growth of the fish in the tank and will affect their health. What an experienced aquarium owner is constantly aware of is the need to provide 12 hours of effective and appropriate lighting in their aquarium in order to provide an atmosphere as close as possible to the occupant's natural surroundings.

For this reason, a conscientious aquarium owner will always be on the look out for the best combination of lighting that they can provide for the fish their care. And they may well find it if they opt for T5 aquarium lights.

What is a T5 aquarium light?

Many people get quite excited when they hear the term, T5 because the human brain works in such a way that they automatically assort the number five with the connotation that these lights must be five times stronger than anything else on the market. However for anyone with even the most basic of knowledge of what aquarium lighting would not want to have lighting that is five times stronger because that would only be harmful for the fish, or anything else that lives in the aquarium. The five in T5 applies to something as innocent as the diameter of the tube. Five eighths of an inch (62mm) to be exact. Many people are unaware of this fact, yet when you think of it logically, the same scale carries its way through all of the dimensions of aquarium lighting tubes, up to and including the T8 which is exactly one inch (100mm) in diameter.

So why should the smaller T5 be better than the T8? The answer is simple. Due to advances in technology that have emerged recently the T5 is capable of producing a much more powerful light than in the past. And for those who would immediately come up with the next question. So why don't I just install a more powerful version of the T8 in my aquarium, the answer would be that, the new improved T8 would provide a light that was too strong and may be harmful to the fish.

This new development in aquarium light technology means that the options for aquarium lighting are more interesting than in the past. Aquarium owners who are more experienced and prepared to experiment with their lighting have discovered that T5 aquarium lights produce a light that is "flatter" similar to that of a fluorescent, as opposed to the metal halide which bears similar characteristics to a spot lamp, through shining an intense ray of light on a particular spot. This characteristic can have a derogatory effect on the health of the fish and particularly any plants that are directly under the glare of the lamp, and can even kill it. There are some aquarium owners who claim that the T5's light is too dull so they install a mixture of T5's and metal halides to put on a "show".

If you were to place a T5 aquarium light beside a standard fluorescent tube of exactly the same dimensions you would notice the considerable differences in strength and brightness that the T5 provides. Strength and brightness that is more than sufficient for an average home or office aquarium.

The numbers of T5 aquarium lights that should be installed in an aquarium should be decided by the volume of the aquarium. They should be installed in even numbers if possible in a sequence running blue, white, blue white ad infinitum. As is the norm, there will be a timing system installed in the tank which will switch the T5s on and off once or may be twice a day. A worthwhile tip for the aquarium owner who wants to get the maximum from the color combinations provided is to separate the timer options so that the blue T5 fluorescent tubes will switch on a half an hour before the whites and switch off half an hour after. This will probably require the installation of another timer system. However it will be money well spent, as it will be a major tool in curbing the spread of algae, especially if there are corals in the aquarium.

For aquarium owners who are considering switching from standard fluorescent tubes to T5s there may be some consternation when they discover how much this investment will cost them. However switching to T5's has to be considered as a long term investment both in terms of how long they will last, the lighting power they provide and the positive affects that they will have on the aquariums occupants. When compared to metal halides the comparison is slightly easier to make as they are much the same price. The only choice that is left to the aquarium owner in this instance are to decide whether he wants to provide the fish under their protection ideal light or cook them under a spot lamp.

So that people who are considering switching to T5 fluorescents don't get the impression that all is "light" there are certain drawbacks to be considered. The tubes are inclined to become very warm of an extended period of operation. For that reason it is worthwhile considering operating them in shorter cycles. Another problem that may occur is because the light is less powerful than that of the metal halides it may have difficulty reaching deep into the tank. This will not affect the fish as much as the corals at the bottom of the tank, especially if it is deep. This is the reason why many owners install a metal halide bulb or two to make sure that light penetrates deep within the tank to specific points.

T5 aquarium lights are fairly new and the exact extent of their potential is yet to be fully and totally ascertained. There can be no doubt that they will have the potential to provide fish breeders with a cost effective and efficient way to provide adequate sources of light for their aquarium.

Size range

Both the Marine White and Marine Blue Actinic T5 lamps are available in three sizes:

24Watts - 550mm - 22"

39Watts - 850mm - 34"

54Watts - 1150mm - 46"

T8 and T12 Aquarium Lighting

Fluorescent aquarium lighting comes in all different colors and sizes. When choosing the right lighting system for your aquarium you should fully understand all of the options before making a decision. One of the most common lighting size options is the T12 light fixture. This fixture is being replaced more and more by a smaller more efficient version called T8 fluorescent lights. This article will explain the differences in cost and efficiency between the T12 and T8 light fixtures.

Size

T12 fluorescent light bulbs are 1.5" in diameter. These light bulbs are run on magnetic ballasts that are there to limit the amount of electrical current running through the bulb. The magnetic ballasts are not as quiet or as efficient as electrical ballasts. T8 light bulbs are 1" in diameter and run on electrical ballasts. When compared to the T12 bulbs, T8 fluorescent bulbs have an illumination output that is more efficient. The T8's slimmer design allows the illuminating gasses to run more efficiently while using less wattage.

Both T12 and T8 lighting options are available in a variety of different lengths to

meet your aquatic needs. From as short as two feet in length to as long as six feet, there are many choices to customize your own aquarium lighting.

Cost

Since the T12s were the standard sized bulb used for a long while, the lighting fixtures, bulbs and ballasts are slightly more available than all the equipment needed for the T8 lighting system. There is a conversion option for T12 if you want to change over to T8 bulbs. The initial cost of conversion might not be an attractive option but it pays off in the long run when you save on the amount of electricity used to power the T12s. Since the T12 light bulbs run on magnetic ballasts, they consume more wattage making them less energy efficient than the T8s. When starting from scratch the T8 lighting option can be a little more expensive to purchase outright than the T12 lighting option. Once again, the money saved on electrical cost should more than make up for it over time.

Advantages and Disadvantages

T8 fluorescent light bulbs have a smaller diameter than the T12 lighting system. Despite the sizing difference of the two bulbs they still put out roughly the same amount of lumens. Because of the smaller diameter of the T8 bulbs, more of them can be packed into the same canopy than the T12 bulbs. This is a preferable solution for larger, deeper aquariums because it results in an overall brighter illumination making it perfect for plant life, corals and invertebrates.

T12 light fixtures run with magnetic ballasts which is less energy efficient than the T8 option that runs with electrical ballasts. The magnetic ballasts cost more to operate than electrical ballasts and can be quite a bit noisier while running. The T8 light bulbs run cooler and provide superior light and color quality. This allows for a more natural lighting in the aquarium than can be provided by the T12 light bulbs.

The only negative feature about the T8 lighting option is that the replacement bulbs are not as readily available in aquatic retail stores. There may be less available color, size and lumen options in the store so shopping for them online could be your only option. The good news is lighting manufacturers are gradually moving away from the old technology and replacing it with the newer more efficient lighting options. In time the T8 replacement bulbs should be more readily available through local aquatic retailers.

Conversion

When deciding to convert your T12 lighting fixture into a T8 lighting fixture you might be a little hesitant when you hear how much it will cost. The silver lining is T8 will pay for itself in approximately three years because of how efficiently this lighting option runs. You will end up saving more money on replacement bulbs

and electricity when you switch from T12 to T8.

To convert from T12 to T8 lighting fixtures you will need to replace the magnetic ballasts with electrical ballasts. The end caps will also need to be switched out so that slimmer T8 bulbs can be used in place of the thicker T12 bulbs. You will need to be sure not to exceed the maximum wattage allowed by the fixture or it could present a fire hazard.

Pictures







If you have invested money on your aquarium by purchasing plants for it, you will need to look after them if you want them to grow to their best. This is why some owners of planted tanks will add a CO₂ system to aid the plant growth. It injects CO₂ gas into the water which the plants will then feed off. These are available in various styles ranging from an aerosol version where you manually fill up a diffuser daily, right up to expensive systems that are automatic and use larger CO₂ bottles. The system you require will depend on the tank you have and which plants you are wishing to grow. Research your plants before you buy them and it will help your decision on which system to get.

At aqua-fish.net there is an article covering this topic:

Aquariums And CO₂ Systems

Overview:

In planted freshwater aquariums, one must use multiple techniques to promote healthy and thriving plant growth. This includes proper substrate, adding CO₂, lighting, and fertilizers. I will now explain the use of CO₂ systems and how they work and benefit your aquarium.

First off, for those of you who do not understand the basics, plants need energy, as do we as humans. They get this from water, sunlight, nutrients in the ground (or water in the case of aquariums), and CO₂. In aquariums, adding CO₂ to the water helps promote healthy growth of the plants, and differences can easily be seen. Plant in general will grow larger, and taller with the added CO₂. And yes it is true that fish take in Oxygen and give of CO₂ as a waste, but this is not enough for you tank. Adding a CO₂ system to your set up will be beneficial. A planted tank will show significant differences when a CO₂ system is added.

Yeast CO₂ reactor system:

This is a very common inexpensive CO₂ system. Basically, yeast, a type of fungus used in baking, consumes sugar and releases CO₂ gas as a waste. We as aquarists use this to our advantage. Through my journey into the exotic pet world, yeast has proved itself useful as many things, including producing CO₂.

To capture the CO₂ from the yeast, one must use a sealed container where the yeast does its work. The way these systems work is pretty simple, and maintenance is simple and easy as well. Firstly you add water, I find that using tap water works fine, but if you get town or city water, there may be added chemicals that may cause problems for the yeast, so maybe use drinking bottled water. Most systems that you purchase will let you know how much to fill it up, I fill mine up almost to the top, and then I add yeast, and sugar. I add about a half a teaspoon of active yeast and a teaspoon of sugar. Many brands also sell a stabilizer which is supposed to aid in the production of the CO₂ and I feel it makes it last longer before I must change it, but I often do not use it. I change the yeast, rinse out container every month or so.

The container is attached to airline tubing, leading from the container top that often easily unscrews, down to the diffuser. There are two types of diffusers, one where the bubble of CO₂ travels up a spiral or gradual ramp type diffuser to increase the time that the bubble is in contact with the water, and the other one user is often glass. The glass ones are harder to find, but the way these work is that they decrease the size of the bubble, increasing surface area that touches the water.

CO₂ bells are also used, more uncommon, these trap CO₂ bubbles under them and

the CO₂ is slowly released into the water. Basically the bell is an upside down bowl placed over the airline tubing the CO₂ comes out of.

The yeast itself is living, so it must be kept in ideal conditions. I keep my reactor at room temp, and keep the yeast itself in the refrigerator until ready to use.

You can purchase these simple set ups from local fish stores for anywhere from \$20-\$40. Or make your own. Later in this article you will read how to make your own system.

Pressurized CO₂ system:

Pressurized CO₂ systems are great for larger tanks. The yeast reactor systems should be used for up to about 29 gallons in my opinion and experience, and then pressurized should be used for larger tanks. They last longer and work more efficiently; this expensive solution is actually fairly simple. Expensive to set up (\$100+) it is not too costly to maintain. I find that getting it filled at machine shops and paintball places works well. Most though are the larger canisters that must be filled at welding places. These must only be filled every month or two and you have control over the CO₂ flow.

The way these work is a canister, pressurized with CO₂, then it goes through a pressure regulator, then through the airline tubing into the tank, and then the bubbles are then diffused into the water with the option of methods described above.

And another common way of diffusing the CO₂ is a reaction chamber. These work by the water flowing through it and the bubbles of CO₂ staying in the chamber and diffusing into the water that way. These tend to be a bit more costly (\$30-\$40) but very efficient and worth the cost.

In general I would highly recommend the pressurized systems over anything else, but cost can be a factor. And remember, that these can still work great on small nano tanks, 5.5g, 10g and so on. If you do end up placing one on a smaller tank, try using a paintball canister. Cheaper and smaller, they will work great on the nanos.

Do it yourself CO₂ reactor and diffuser:

Here I will describe how to make your own CO₂ yeast reactor, aka DIY CO₂ reactor. It is cheap, works adequately, and is easy to make. Also included is a simple home made recipe for the canister.

DIY CO₂ yeast reactor:

Materials needed...

- A plastic container (juice container, soda container)
- Airline tubing
- Diffuser – Make one or purchase one

Procedure:

Take the cap (should screw on) and use a drill or nail and make a hole, smaller than the airline tubing into the top. Use pliers and pull the tubing through it, and it will make a seal, no glue needed.

Take the tubing and attach it to the diffuser in the tank.

DIY Diffuser:

Couple options, buy one, or make one.

Buying one:

- Use a bell diffuser, glass diffuser, or a ladder form of one.

Making one:

Materials needed...

- Siphon from the end of a gravel vacuum used for aquariums.
- Foam (used in filters)
- A small power head/pump that fits the siphon
- Airline tubing (from the canister)

Procedure:

Drill or poke another hole in the siphons side, place foam in the bottom to block the opening, and then place the pump on top. Turn the pump on and the water will be pushed into it, while bubbles are rising up into it towards the pump. This will aid in the diffusion of the CO₂.

People often also just stick their airline tubing directly into the filter and the movement of water will help the CO₂ diffuse, not super efficient, but works fine and not hassle.

Recipe:

The basic simple recipe is as follows.

- -Fill container up.
- -A fair amount of sugar, I add about a spoon full for small containers, and up to a cup for larger containers. (no science)
- -Add about a teaspoon of yeast, less if container is on small side.
- -1/2 a teaspoon of baking soda (optional) and less if container is smaller.

I have no idea what the baking soda does, I guess it acts as a regulator, but I have found it works fine with and without it with little difference.

CO₂ Tips:

When using CO₂ systems, a glass cover works fine, no need for egg crate or no top. But you can have no top. The CO₂ must stay in the water to be used, so trying to increase diffusion with the water surface (increasing ripples, power heads agitating water surface) is not needed and can decrease the CO₂ in the water, defeating the purpose of having your expensive system. Just remember, do not overstock a planted tank, and you should be fine. When making a planted tank, focus on the plants as much as the fish.

Negatives to the CO₂ system:

CO₂ systems are good for planted tanks, but if you are looking for heavily stocking your tank (a sometimes frowned upon idea) CO₂ systems would not be good to do. With planted tanks, adding the extra CO₂ can be good for the plants, but when too many fish are added, you are basically suffocating the fish. So in general if you wish for more fish, do not have real plants. If you still want plants, look into fake plant, they can still give a nice look. And other than that, make sure that you have nice aeration in the tank, either an air stone or a good water flow at the top of the water, creating enough ripples in the top.

Another negative to the CO₂ systems may be cost for the higher end set ups, but other than that, they can be very beneficial to your planted tanks.

Conclusion:

DIY CO₂ systems are obviously the cheapest, but least efficient. For any planted tank that you plan to put time and money into, invest in a pressurized CO₂ system. This will greatly improve the overall look of the planted tank. But do remember that pumping CO₂ into the water will limit number of fish in the tank. This article is to be used as one source for your research. Please do continue research and get other peoples' opinions before doing anything. Most of this has been put together from my own experience and research on aquariums in general.

When it comes to specialised equipment I always think hard before I purchase an item, do I really need it, will my tank be OK without it?

There is no point spending money on items that you are not going to use to their full potential or if they are of no benefit to your tank. Below is a short list of some of the items I have bought and used and would recommend to anyone who is having certain problems that they can't overcome as the tank stands.

Water quality is always an issue and when you are keeping delicate species of fish your mains water may not be up to scratch so how do you overcome this. The easiest way is to purchase a water filter that is fed from the mains and will purify your water to a high quality.

HMA filters are basically two filter cartridges that the water passes through and the heavy metals are removed as well as other toxic compounds, with these there should be no need to add water conditioner when performing the water changes as long as the filters are replaced at the required intervals. Taking this one stage further is to invest in a Reverse Osmosis unit, this will strip everything out of the water and it is that pure that the water needs to be re-mineralised before use. These are very useful if you live in a hard water area and the fish you wish to keep require soft, acidic water to be happy.

At aqua-fish.net there is an article covering this topic:

AQUARIUM REVERSE OSMOSIS

In the aquarium hobby there are many instances where reverse osmosis water is used but to most people it can be quite baffling, if they have never actually had to invest in a unit. Hopefully this article will explain its uses and also exactly what it is.

It is mainly used for water softening which is ideal for discus, angelfish and in fact nearly all of the South American species, also it is now used with almost every marine or reef tank.

An RO unit (reverse osmosis unit) is used as a water purifier and in fact it will reduce the pH of the water as it pulls out 99% of all total dissolved solids, leaving the closest thing to pure water that you can get. This is particularly important where water quality has to be at its highest for the more delicate species of fish and where internal or external filter cannot clean the water to reach desired levels.

The water is so pure that it has to be re-mineralized before use, as it can become unstable due to the KH potentially dropping, which in turn can cause a pH crash.

So how does the unit work? Well basically osmosis is where two solutions of a different concentration will try to balance themselves out if a semi-permeable membrane is dividing them. A reverse osmosis unit also uses a semi-permeable membrane that is sited inside its filter housing. Water is introduced under pressure into the unit and as it hits the membrane, only the water molecules can pass through, the remaining undesirable trace elements and minerals are then drained off through a waste pipe. These units will also remove a lot of the oxygen present in the water so before use it must be aerated to get some back in.

There are many types of reverse osmosis systems, but for ease of reading I will explain the basic one - a three stage.

The membrane used in these units is of a delicate nature so pre filters are always included in the set ups. As soon as the mains water hits the unit, it will enter the first housing chamber, which will contain a sediment filter. As the name suggests this will remove the larger particles from the water and normally they are capable of removing anything as small as 5 microns in size. They should also be of a high enough quality to remove bacteria, spores etc. Normally these are replaced on average every four months, but the golden rule is to change it when it starts to discolor, normally turns brown over a period of time. This will be the cheapest filter in the unit to replace, prices average between 2 to 3 pounds for each one.

The water will then pass onto the next filter housing chamber; this will contain the carbon pre filter. This works along the same principles as using carbon in your tank, it will remove chlorines, toxins and any other chemicals that shouldn't be there.

It is a useful tip to check with your local water authority as to which chemicals are used to clean the main water pipes as sometimes chloramines are used, this is a mixture of chlorine and ammonia, so make sure that the carbon pre filter is capable of dealing with this to prevent it getting through. Usually these are rated on the gallon age of water that they can treat before they need changing, usually six months of use is the max.

There are different types of carbon pre filter – CCB filters are coconut fiber carbon blocks, CBR's that are slightly higher quality and normally deal with a higher gallon age of water, and granulated carbon filters. You can also purchase acid rinsed filters, specially designed for discus set ups to keep the pH level down.

The water has now passed through the two pre filters, and at this point is ready to enter the filter housing containing the membrane. There are two main types of membrane used, but the most common in household RO units are the TFC membranes. This stands for Thin Film Composite membrane; these are designed for mains water but will get damaged if in contact with chlorine, hence the need

for the pre filters.

The other main one is the CTA membrane (cellulose triacetate); these are more for industrial units and are quite expensive to buy.

The filtered water will now leave the unit to be collected in the vessels ready for use, and the water that wasn't allowed to pass through the membrane will leave the unit by a drain tube. On this tube will be a flow restrictor valve, this is what builds up the pressure in the unit to make it so efficient.

I have just described to you the workings of a basic 3 stage unit but they can be supplied in 4, 5, and 6 stages for extra efficiency. One of the main extras that can be added on is a DI unit which basically gives the water a final polish, and this contains a resin that is re-usable when rinsed.

There are many things to remember when using these units; always use clean barrels, buckets to run the purified water into, never use metal or dirty ones as this will just foul the water so you would be undoing what the filter has done.

The unit is dependant on a high enough water pressure from the mains to make it run efficiently, if the pressure is too low an additional pump can be fitted inline to increase it.

They are also dependant on the temperature; if it drops below 1 deg then the membrane will become damaged. A lot of people have their units fitted outside so if there is any danger of frost the unit must be brought indoors.

Never let the membrane dry out as this will render the membrane useless, membranes cost anything up to 30 – 35 pounds, so it is well worth looking after them, and normally they will last for 2 – 3 years.

The efficiency of your reverse osmosis unit can be tested with a TDS (total dissolved solids) meter, my mains water runs at 256 TDS, and after it has been through the unit the reading is 0 – 3 TDS. The meters can be added inline or handheld ones are available.

Aquarium reverse osmosis systems are a good investment if running marines or soft water loving fish so I do hope this article has explained the workings of them to you.

In the summer months many keepers will have problems keeping the tank temperatures down, in this situation. Never be tempted to turn the heaters off. Nowadays it is possible to add to your tank fans that will sit on the top and cool the water down; another option is to invest in a chiller unit. These work on the same principle as a refrigerator, the water

passes through them and the unit extracts the heat until a preset temperature is reached. These units can be pricey but if you are having constant problems every summer with the heat they are a very good investment.

At aqua-fish.net there is an article covering this topic:

Things to know about Aquarium Chillers

In this article I'm going to answer the most common questions regarding aquarium chillers, their usage, purpose, advantages and disadvantages. These questions have been compiled from questions asked by our previous visitors.

What is the purpose of an aquarium chiller?

To chill the water in an aquarium. Read below why some fish need this. Although I mention fish only, corals or live rocks need stable temperature too. And some freshwater plants are sensible to dramatic temperature changes too.

Do I need an aquarium chiller?

Well... It depends on the type of your aquarium. If it's a marine fish tank, then it is very likely that one needs a chiller. This results from the fact that saltwater fish live in waters with very stable temperature (unlike freshwater species). Unless you live in a country where the average yearly temperature stays below 20°C (even in rooms; which is not likely), it is not necessary to buy an aquarium chiller.

The second possibility when one needs a cooler is a coldwater fish tank. Some fish species (especially small ones) from rivers can be kept in home fish tanks, or in fish ponds. Naturally, it is hard to imagine a chiller connected to a garden pond. Back to aquariums... Fish from rivers are accustomed to temperatures of 5 to 20°C, sometimes more. In order to maintain the temperature within some acceptable interval, any such aquarium cannot be without a chiller.

The third situation when a fish tank requires a chiller's help is too hot temperature (usually during Summer). I won't discuss this point since it is clear that any fish tank requires help when the temperature exceeds 30°C. If you cannot afford a chiller, you can use chilled water (put a bottle into the refrigerator), ice, or darken the room.

Related questions

- *Do I need an aquarium chiller for tropical fish?*
Tropical fish don't require cold water, however temperatures higher than 30°C can cause serious problems including death. It is also necessary to realise that the higher temperature in the aquarium is, the less oxygen is

present in the water. With the same aeration there is much more oxygen in a fish tank when the temperature is 20°C than when it's 27°C!

- *Do I need a chiller for a cold water aquarium?*
Yes, this has been already answered above.
- *Do I need a chiller for a reef tank?*
Yes, this is also answered above.
- *Is chiller important for a saltwater fish tank?*
Yes. As it is mentioned already, marine fish live in very specific conditions where the temperature, pH and hardness change much less than in freshwater environments. Any dramatic and sudden change may affect marine fishes, and thus they can even die. So yes, a cooler is very important for a marine aquarium!

How much does an aquarium chiller cost?

I have seen some from \$100 (the cheapest) up to \$1400 (probably even more; the most expensive on the market). Here is a link which should help you to find one: google.com/products?q=aquarium+chiller&btnG=Search+Products&hl=en&show=dd (the link did work on 29/10/2008, contact us if it doesn't work any longer, please). Before you buy any, ask the seller about chilling as some smaller (usually characterised by lower wattage) chillers cannot cool the water enough. Then more units are needed to achieve the same effect as a bigger one could do easily.

How do I setup/install an already bought chiller?

It's good to place a chiller somewhere to an open place due to ventilation. Otherwise it is hard to tell you some "general rules" due to uniqueness of each product, although they operate on the same principle. Always follow the guidelines provided by the manufacturer.

Do Goldfish require an aquarium chiller?

Yes. They're coldwater fish and unless you want to keep them unhappy, don't buy a chiller. Moreover, goldfish should be kept in garden ponds rather than in home fish tanks.

Does Axolotl need an aquarium cooler?

Not necessarily. According to an already existing article on Aqua-Fish.Net, these beings lives in environment where the temperature varies between 10°C and 22°C, however sometimes it is even lower than 10°C. Therefore if you're sure that 22°C is the highest possible during the whole year, then your aquarium doesn't need a chiller.

What is the principle of how an aquarium chiller works?

First, the water is pumped through the heat exchanger, where the cold compressed gas flows. This compressed gas is there in order to pick up the heat from the water in an aquarium. The heat is taken back to the compressor and the pressure drops. Finally, the heat is taken to a radiator. A fan sucks new air and lets the hot air go out of the chiller. This is taken from another article on our website: aqua-fish.net/show.php?h=aquariumchillers.

Is there a way how to chill an aquarium without a fish tank chiller?

Yes. As it is already mentioned above, darkening the room helps the most. Sometimes this is not sufficient. In such a case do daily water changes and add cooled water into the tank. I found adding ice to be a very useful method to make water colder. About 20 cubes (each of 1x1cm) of ice lowered temperature in one of my aquariums (42L) from 30°C to 27°C immediately. This, however, also depends on how long has been the water in the freezer. The longer, the better effect in the end.

Do aquarium chillers run all the time?

It is possible to run them non-stop, however it is not recommended. It's like a refrigerator; They don't chill all the time (it is automated, naturally).

How big should be a fish tank chiller be?

The size doesn't matter. It's all about wattage and output, and flow rate. For example, compare these two chillers:

- Pacific Coast CL-85 micro chiller
- 1/4 HP Oceanic Aquarium Chiller

The first one's output is 85 watt. 80-160 Gallons per hour is the optimal flow rate. The dimensions are: 4" x 4 3/4" x 7 1/2" . The second one's flow rate is between 475 and 800 Gallons per hour. The dimensions are: 13 x 17 x 17.31 . The difference should be clear. The more gph, the more wattage and space.

What is the best chiller for aquariums?

Although I don't want to prefer any manufacturer, Oceanic seems to be very good. However, even Mercedes-Benz sometimes produces a car that shows problems after being used. Make your decision based on available funds, warranty, and availability.

What are pros and cons of an aquarium chiller?

Advantages:

- Chillers make the temperature stable with no effort. This results in happier fish. Please look at the beginning of this article to understand why some fish simply need a chiller.
- If you're going on a vacation, you don't have to worry about overheating your aquarium(s).

Disadvantages:

- If there is a failure, you should better have a backup chiller (this can be expensive depending on how many fish tanks you own)
- Wattage doesn't have to be the best. Consumption can be a serious problem if you're keeping fish only as a hobby (more tanks with chillers = more investments).

Can a frozen water bottle act as chiller in a fish tank?

Yes! But for limited time only. It is already mentioned above as a way of using cheaper solutions than buying coolers.

Is it cheaper to run an air conditioner or a fish tank chiller?

This depends on the room and the amount of aquariums, but also on the size of aquariums. If you need to chill only a one fish tank, then an aquarium chiller is better. From what I know air conditioners usually need at least 1KW/h. If you had 10 small aquariums, then buying 10 chillers wouldn't be wise since their price + their energy consumption will be higher than if you bought an air conditioner only. I recommend you to calculate this equation:

cost of air conditioner + energy consumption of such conditioner = x
cost of chillers + energy consumption of such chillers = y

If x is bigger than y, then it is better to buy chiller(s). Otherwise buy an air conditioner. Also bear in mind that each air conditioner operates for a limited space. So if a room is 10x10 metres big, then it is usually needed to buy at least 2 air conditioners to chill the air to the desired temperature.

How to get a discount when I buy a chiller?

It's so easy; Ask for it! I mentioned it already a few times on this website. When you're buying a thing for more than \$200, ask for better price! Do not hesitate, it's your money.

Filtration in an aquarium is one area that can always be upgraded. Basic internal filters sometimes cannot cope with the bio load produced inside the tank; if this is the case then it is often worth investing in an external canister filter or even adding two filters to your tank. One of the oldest styles of filtration is often bypassed nowadays but it is a filter that I have used many times and have had good results. This is the diatom filter, it works by the water passing through a special medium and extracting minute debris and hosting beneficial colonies of bacteria to really polish your water and remove the toxins. For some reason these have found less favour in recent years but I think they deserve to make a comeback.

At aqua-fish.net there is an article covering this topic:

DIATOM FILTERS FOR AQUARIUMS

Diatom filters are used in the aquarium hobby mainly for polishing the water to almost perfect clarity, plus they are unsurpassed for filtering out the smallest debris & even parasites from the aquarium which in turn leads to healthier fish. Using these filters has also increased the variety of fish that some of the large public aquariums can now keep on display. How many of us at some stage have been plagued with green algae and needed to find an efficient way of eradicating it, well these certainly do the job.

So what is a diatom & how do the filters work

Diatoms are basically a single celled organism that feed on silicates in the water which they use to create a protective hydrous silica cell wall. When the diatoms die off they leave behind a shell that is full of minute pores, (some of the pores are as small as 3 microns), but inside the larger pores there are a second, smaller pore (roughly 0.5 microns). This in effect means that the mass of the diatom is mainly formed from empty spaces, ready to trap the smallest of organisms. The empty shells then collect at the bottom, forming a sediment which is known by a couple of names, either Diatomite or Diatomaceous earth.

Because of these minute pores they could be class as microscopic bio balls, hence the great filtration power of them for collecting the minute debris. A word of warning though, if handling the diatomaceous earth, do not inhale it as it can cause lung problems as it will become lodged in the areoles-it is that fine. A dust mask is a must when either replacing or cleaning the earth.

These filters are commonly used in the beer industry and even in some public water purification systems; they are sometimes used in swimming pool filters as well.

Most of the filters on the market work on the vortex system where water is pumped into a chamber that is filled with the earth, keeping it in solution to maximize the surface area of the medium in contact with the water, and a fine carbon is normally run alongside to trap any toxins that are released when the debris etc. is filtered out.

As the diatoms are so fine, I would recommend that a pre-filter is added before the diatom filter to remove the larger debris from the water.

The reason for this is that they can soon become clogged and have to be cleaned out on a regular basis. Continual running of these is not advisable due to the clogging and most aquarists will only run them every now and again to polish the water, probably once a week for each tank.

These filters are so efficient, that not only do they remove suspended algae from the water, thus the superb water clarity, but also they will remove bacteria and are great for removing parasites that are free swimming. Obviously they cannot remove the parasites attached to fish but they can help the fish heal quickly from cuts and abrasions due to the reduced number of bacteria.

White spot is a tremendous problem to many fish keepers, who try to combat it with medication, but this method can have its drawbacks, it could affect other creatures in your tank. Running a diatom filter will dramatically reduce the parasite population, near enough eradicating it, therefore giving the fish more of a fighting chance of a good recovery.

I have used one of these myself in the past and found that running it for three to four hours on one day of the week certainly made a difference to my tank. I made myself get into the habit of rinsing the earth after every use so that it was always there ready to switch on as required.

When these first came out the diatom was a very fine, dry powder that was quite dangerous to use if the proper safety protection wasn't worn but nowadays the media is dampened down to try to reduce the risk from the dust.

In its raw state diatomaceous earth is a very light and porous rock but when it is powdered down it can have some abrasive qualities so it is even used in toothpaste & some polishing creams, it is even used to make cat litter due to the amount of moisture it can absorb.

I thoroughly recommend the use of these and surprisingly enough not many fish keepers have actually heard of them, never mind seen one. Surfing through the internet should supply you with a list of reputable suppliers of these filters; they are worth every penny that they cost.

Hopefully this article will have convinced you to at least look at the benefits of running one as that is the only way you will truly see the difference they make to the aquarium.

Ultra violet sterilisers have been used in the pond keeping hobby for a few years but now are drifting into aquarium systems more and more. They are the next stage after filtration and they remove free floating algae spores or any parasites that are floating about in the water. Using these can only be beneficial to the fish but some keepers say that the fish tend to rely on them if used for long periods of time. I understand both sides of the argument but have no strong views either way, I regard them as an item that is personal choice whether to use or not.

At aqua-fish.net there is an article covering this topic:

UV Clarifiers/Sterilizers

What is a UVC?

A UVC (Ultra-Violet Clarifier) is used for the purpose of removing water-bound Algae spores. This is primarily used for ponds where algae is most prevalent because of the still water conditions. It can also be used to clear algae from indoor fish tanks with great effect.

A UVS (Ultra-Violet Steriliser) is basically the same as above but is usually more powerful.

When do we need them? For pond owners, this next section is a “must read”, for aquarium owners, some of this information will be informative and may raise a few questions in your present methods!

Traditionally, ponds are naturally filtered by live plants and poorly maintained. When they are new, they look great, but after a year or so, they tend to get forgotten and allowed to stagnate and silt up. This is a shame, as well maintained ponds are a real pleasure as well as a small pocket of nature in your garden.

Do you have a pond? When was the last time you changed the water? Have you cleaned the bottom lately? Most people will answer “No” to these questions and probably ask why!

As with an aquarium, most garden ponds are closed environments and will require maintenance. You cannot rely on the rain to keep the water levels stable, and plants can only remove so much waste. Ponds have a tendency to be overstocked too. One of the side-effects of outdoor fish-keeping is that nature has a way of multiplying your stocks of fish. Each spring, adult Koi and Goldfish will breed and you won't notice until the fry start to grow to a size that you can see clearly. Each adult pair is capable of producing very large spawns, and if there are no natural predators around, these will survive to adulthood quite easily. You may introduce just a dozen fish to your pond, but in a couple of seasons, these could be 2-300!

If the water conditions are poor, it will not stop the fish from breeding, but will hamper your ability to see what you have! Poor water conditions will lead to infections and premature deaths though. You wouldn't dream of letting your aquarium go untended for months, so why treat your pond that way?

Anyone who has a pond in their garden is prone to algae. It can be unsightly and restrict vision into the water, hiding the fish from view. The risk of disease is actually greater in ponds than their indoor counterparts, as they are exposed to birds, mammals and insects not present indoors. These wild species can carry diseases and parasites to your pond. They are also prone to silting up. Smaller ponds will fill with leaf litter and plant debris very quickly, larger ponds are more able to cope and will break these down into mulch, but it will still build up over time and can become a problem.

The primary cause of algae is a build-up of nitrates in the water. This is one of the first signs of poor water quality, in the same way as it affects your indoor aquarium. Daylight is another major factor, and unlike your aquarium, you can't easily control the amount of light that your pond gets. You can build it in a shaded area, which will help to reduce the amount of sunlight that the pond receives, but you can't turn the lights off!

There are several things that can help, and they work well together. Firstly, movement of water will reduce the green water build-up. A simple fountain will cause currents in the water, helping to reduce green water, but will not stop it altogether. Regular water changes will help a great deal by reducing the nitrate levels, but if you have a large pond, that involves a lot of water! You need to do water changes regardless of other methods, but you can reduce the frequency and amount per change quite simply by fitting a filter! An external filter will be very beneficial and can be used to create an attractive water feature such as a waterfall as well. This helps in two main ways. It increases the aeration of the water and creates good circulation in the pond. Pond filters are not as expensive as you may think, and require minimal maintenance as long as you get one large enough for the volume of water in your pond. Most ponds of 100 gallons or more benefit from external filtration, but few have this luxury. To filter your pond can be

difficult and will involve running mains power into the garden, but once done, the benefits are very noticeable.



But I haven't got a pond! What about UVC for my fish tank?

Good question! Can you fit UVC to your fish tank? Yes, of course you can! However, similar rules apply to the installation, so read on.....

Always buy a bigger filter than the recommended capacity so that maintenance is reduced, there is better filtration and you can reduce the amount and frequency of water changes. Don't forget that you will also need a pump to lift the water from the bottom of the pond to the filter continuously, to maintain the bacterial culture in the filter. If you need to turn the pump off at night because of the noise the water makes, change the feature so that it doesn't cause annoyance at night!

Most of the modern pond filters now have UVC built into them, but if you prefer, you can buy the two separately. The main advantage of choosing your own UVC is that you control the power and effectiveness better. The built-in ones are designed for a specific volume of water to suit the filter and the manufacturers expected use, whereas by buying your own UV, you can increase or decrease the effectiveness to suit your needs.

Most built-in UV clarifiers are exactly that. They are specifically designed to treat algae, not necessarily to treat the diseases that are water-bound too. This is not to say that they don't, it all depends on the volume and throughput you demand. If you want sterilization as well as green algae control, buy bigger!

Can you have UVC without a filter? Yes, there is no reason why you can't, but bear in mind that you still need a pump to force the water through the UVC!

Something else to consider is that dirty water will impair the UV very quickly, with silt and debris building up inside the unit, blocking off the light from the tube, so position of the intake would be crucial, as would a pre-filter on the end. But in reality, if you are only suffering from green water, a UVC attached to the feed to a water feature would be just as effective. I have seen fountains with UVC fitted to them, but it does involve bringing the piping out to the bank where it can be attached to the UV unit, so you couldn't use some of the small submersible fountains that are available today for this purpose.

Ok, now you wanted to know how you can fit them indoors, and why bother?

There are several very good arguments for UVC on the aquarium. They not only reduce algae, but are very effective at controlling disease too. One UVC on a 100 gallon tank will help to reduce the spread of diseases such as white spot, flukes, velvet and ich. UV kills the water-borne spores that spread the diseases through the water, so in conjunction with a good external canister filter, they become very beneficial. A small 15W UVC will sterilize 500 gallons of water per hour without harming the bacteria in the filter. It can be placed on the inlet or outlet of the filter so that the water is forced through under pressure. You cannot use UVC on a gravity fed supply, so if you are connecting to a gravity fed sump system, it must be on the pump side. The reason for this is that gravity feed will not expel all the air inside the unit or force the water uniformly past the tube. As yet, I have not found a UV unit suitable for use inside a tank and would not risk the chance of the fish being harmed by the UV radiation either, so to date, I don't believe it possible to attach this type of system under water.

So, if you have a canister or sump filter, UVC is simple to attach. They can also be fitted to HOB filters, but this is a little more involved and will require some adaptation of the piping. The unit itself can be fitted anywhere out of the way, either next to the filter or anywhere along the piping. Most units are equipped with fitting plates to screw them down, so that the piping doesn't take any of the weight of the unit, and it would be a sensible idea to fix the unit if at all possible.

My UV's are supplied by Hoze-Lock, and have a removable foot-plate for securing to the floor, shelf or back of the stand. They also have directional connectors, so I can fit easily in almost any location. I have three units on my three sumps, each one suited to the volume of water in the system. I use the following guide when fitting a new UVC. Take the unit capacity and halve it, then you buy a very capable unit for the volume of water to control! Every UVC I have has twice the capacity I demand, so I am sure of obtaining the results I want!

Since installing the UV systems I have not needed to treat any of my racks for disease, and that includes the QT rack, (12 tanks totalling 500 gallons, filtered by a single sump), where new fish regularly bring in unwanted diseases. With UVC

in-line, disease is no longer a problem in my QT, saving me hundreds of dollars in meds! (Just imagine the cost of treating 500 gallons for white-spot!)

Another form of filtration that can be added is the fluidized bed filter. These are normally used after the main filtration system, they also polish the water like the diatom filters and are very effective. Basically the medium, normally sand, is held in suspension as the water passes through and the beneficial bacteria will develop their colonies on it. These are used quite a bit by saltwater fish keepers but they are just as effective with freshwater tanks.

At aqua-fish.net there is an article covering this topic:

FLUIDIZED BED FILTERS

Nowadays in the aquarium hobby there are many forms of filtration available from the suppliers, so sometimes it can get confusing as to which are the right ones to use on your aquarium. We have internal filters, external canister filters, running a sump, wet and dry trickle filters, diatom filters plus an old favorite with many people – the fluidized filter bed.

All of the above filters have their advantages and disadvantages but over them all, the fluidized bed filter makes a great secondary filter to use as a back up for your overall system.

They come into their own with heavily stocked aquariums, planted aquariums and marine aquariums. The great advantage with planted aquariums is the fact that these filters will not reduce the CO₂ levels in the water which the plants depend on. Another great advantage of this system is that the maintenance side of them is drastically reduced as they tend to run for much longer periods without clogging and indeed they have the ability to clean themselves.

Internal filters tend to be restricted on the beneficial bacterial count that they can carry, external canister filters if not cleaned thoroughly on a regular basis can be slowed down immensely when they start clogging so a lot of maintenance is involved. Wet and dry trickle filters are basically a glass or acrylic tank with bio balls, live rock, or similar media, where the pumped water basically drops into the filter randomly covering the media but can have a lower bacterial count if not set up correctly.

As the name suggests with fluidized filters the media is held in suspension by a pumped water flow so that every particle of the media will have an exposed surface area to contain the beneficial bacteria need to purify the water of nitrates, ammonia etc.

So basically these filters consist of a pump to create the water flow, a chamber or tank to contain the media, and an outlet to feed the purified water back into the tank.

Advantages

There are several types of media that can be used in these filters, the most common being sand, white quartz, and even sintered glass. Once any of these materials are in suspension in the chamber their surface area is increased dramatically, every small grain being utilized to its fullest to act as a platform for the beneficial bacteria. There can be anything up to 6000 square feet of surface area in as little as 1 cubic foot of media.

This also means that the size of the chamber can be decreased due to the efficiency, so a filter with a chamber say 3 foot high will quite easily cope with anything up to 1000 liters of water.

As the grains of media are in total suspension they will continually collide with each other in the chamber, thus they can clean off any excess debris while they are still filtering, hence the need for less maintenance and less space taken up by the hardware which is an obvious bonus as in a lot of fish houses, free space is at a minimum.

A lot of fish breeders are using this system as a backup, mainly due to the fact of the efficient reduction in ammonia and nitrate levels which can increase rapidly in their growing on tanks as they will feed the juvenile fish high protein diets in order to aid the growth rates which in turn will result in higher fish waste.

Due to their simplicity there are several models on the market, supplied by the big aquarium distributors, which are relatively cheap, compared to other forms of filtration; TMC, Red Sea, Rainbow, Quicksand, and Pentair all produce their own brands. These can range from fifteen to twenty pounds (thirty to forty dollars), but are supplied without the water pump.

But to save the cost of a new model a simple DIY version can be set up with minimal effort. A three chamber sump tank can be used to great effect, raised above the main tanks. In chamber 1 - water is fed by means of a pump, and some sponge media can be added to act as a pre filter, in chamber 2 the sand, quartz media is added, and in chamber 3 - gravity will feed the water back to the tank. Make sure a non return valve is fitted to the water pump as if there is a power failure and the pump gets flooded, the gritty nature of the media can create havoc on the internal workings.

Disadvantages

There is a lot of debate as to whether the fluidized systems actually hinder gaseous exchange of the water. As they do not remove the CO₂ content, they will not bring oxygen into the water, and indeed the bacteria will consume some of the oxygen. Because of this a lot of aquarists prefer to run an air stone in the main systems to compensate.

Another problem with this type of filter is experienced when a power failure occurs. Although the bacterial colony can recover from this quicker than say a trickle filter, if left they can start to leach toxins back into the system as the media compacts at the bottom, so be prepared to disconnect and lightly rinse the media in aged tank water if the power is off for a great length of time.

As with all biological methods of filtration it takes time to build up a colony of beneficial bacteria, do not expect them to be 100% efficient straight away, they do need to go through a bacterial build up cycle which can take anything up to four to five weeks to accomplish.

Never use this type of filter as your main biological filter, always use them as an additional filter to your present system. They can help out tremendously with heavily stocked tanks, where the food waste, detritus from the fish stocking is larger than normal.

As stated above they are relatively cheap compared to other filtration methods, so overall I think they are a great investment to your aquarium.

The last item I am going to mention is not often looked at as a specialised piece of equipment but I think that does not do it justice. When the owner of a tank goes away for a vacation it can be a worry about feeding the fish. Even while at home some keepers may forget to feed their fish or even feed the fish and then forget they have done it so feed them again.

Investing in an automatic fish feeder overcomes all of these problems, the food is dispensed at set times and refilled when required. Some of the original models were clockwork but nowadays they are battery powered or even the top grade ones can plug into the mains supply. For the small expense of buying one of these they are well worth it.

At aqua-fish.net there is an article covering this topic:

The Convenience of Automatic Aquarium Fish Feeders

Automatic fish feeders help make your life as an aquarium owner much easier. It is often hard to remember whether or not you fed the fish, or if someone else in your house did already, and the automatic fish feeder eliminates missed feedings or over feeding altogether. Too much food in the water can easily clog up important filters, and cause you to have to spend more time cleaning your aquarium tank than enjoying it. There are many different brands and designs on automatic fish feeders on the market, you just have to decide which one is within your means and will best suit your needs.

One of the most popular automatic fish feeders is the Eheim 3581 “Feed-Air” Digital Automatic Feeder. This model is capable of using either granule or pellet fish food types. You can set it to feed your fish up to four times per day. This model comes with its own ventilation system which keeps the food dry, preventing spoilage issues. You can choose what portion size you prefer, and then check the settings on an LCD screen. In case there is an issue, it has an emergency override feature that you can use. This feeder is moderately priced at around \$50.00, and can be found online or in many pet stores nationwide.

If you are looking for something a little more budget friendly, you may want to check out the automatic pond fish feeder. I know the name makes it sound like it is only intended for fish ponds, but it is also intended for aquarium use; apparently it was just given a bad name somewhere down the line. This feeder is powered by battery, and works with all types and sizes of dry fish food. You can set it to do a certain number of feeding throughout the day, or to delve out small amounts of food at regular interval throughout the day, which helps prevent the fish from overeating. It has the capacity to hold enough food for around twenty-one feedings. This will make a dent in your budget of only about \$44.00.

At \$36.95, the automatic fish feeder with hopper from Rainbow is an excellent buy. This feeder has an electric motor, which makes virtually no noise. It is designed to work with any and all aquarium types. You cannot submerge this feeder within the tank as you can some of the other models available. You get a one year warranty that covers parts or flaws. This feeder has an amazing capacity, it can hold a four month supply of food for your fish! Program it to feed as many times a day as you wish, and you set the amount of food to be disbursed. This device can also be used to deliver medicine to your fish as needed.

The next feeder you may want to consider is the Penn Plax Daily-Double 2 Automatic Fish Feeder, priced at around \$28.00. This is a battery powered feeder that you can either attach to the tank, or can sit on the aquarium hood. To decide what amount of food you want to be disbursed, all you do is adjust the knob on the side of the feeder. This feeder works with flake based food, and can hold enough to feed your fish two times a day, for about a month.

One of the most budget friendly automatic fish feeders is the NutraMatic 2x Automatic Fish Feeder. You can expect to pay about \$19.00 for this particular feeder, which is considerably less than some of the other models. This feeder is capable of using either pellet flake fish food, and like many others, is battery operated. You can control the amount of food disbursed, so that you can adjust according to the needs of your fish. This feeder will automatically release food every twelve hours, providing your fish with evenly spaced and portioned meals every time.

If you still need something even less expensive to fit into your budget, look at the Marina NutraMatic 2x Automatic Feeder, which you can find for around \$14.00. If you are looking for a cheap automatic fish feeder, this is probably going to be your best option. This feeder is designed to release food two times a day at twelve hour intervals, and can feed either flake or pellet food, depending on your own personal preference. You can choose how much food you want to be released, so that you are in control. This feeder is also battery operated, and can be mounted onto the rim of your aquarium, or can stand alone.

Even if you do have a fish feeder, you need to check it periodically to make sure it is still in good working order, batteries are still good, and that it has plenty of food for your fish. It is also a good idea to make certain the settings stay the same, such as feeding portions and timers that you have pre-set. Remember, that automatic fish feeders can make your life easier, but like any machine, they still need human intervention from time to time.

13. About the author

Mick Watson

“50 years old; I live in Newark, Nottinghamshire, UK. I have been fish keeping for 30 years and seen a few changes in the hobby, for the better I may add. I used to run two fish houses where I bred several species of fish including 8 breeding pairs of discus. I have also kept a reef tank for over a year and my new venture is to try to get a breeding pair of Oscars so I have bought a group of juveniles to see what happens. I am an active member on several forums and started my own forum in February 2009 as I find some of them seem to distract away from their purpose which is to provide help and information when required.”

14. Important notice

You're welcome to ask questions on <http://www.aqua-fish.net>! Before you ask anything, make sure that your questions aren't already answered at aqua-fish.net, please. These links should help you too:

1. <http://www.aqua-fish.net/show-aquarium-fish.php> – a list of all fish profiles
2. <http://www.aqua-fish.net/show-aquarium-plants.php> – a list of all plants profiles
3. <http://www.aqua-fish.net/show-aquarium-biotopes.php> – a list of all biotopes
4. <http://www.aqua-fish.net/show-aquarium-articles.php> – a list of all articles

Almost on every page of www.aqua-fish.net you can find the Google Custom Search. Use this search whenever you need any information related to fish keeping, please. If you are looking for information from aqua-fish.net only, visit Google and enter these search queries for instance:

1. guppies site:aqua-fish.net
2. discus site:aqua-fish.net
3. filter site:aqua-fish.net
4. heater site:aqua-fish.net