

Select Aquatics of Erie, CO.

A Modern Approach to Aquarium Care



These Tiger Limia tanks show the clean, vibrant, healthy environment aimed for with today's modern approach, used for keeping and breeding rarer, possibly more sensitive species.

Aquarists have been setting up tanks for a variety of reasons since the hobby first took hold in the 1930s. Its popularity increased with the invention of inexpensive and widely available equipment, such as the undergravel filter in the mid-1950s. The goal was to keep the fish alive and relatively comfortable. The fish were to live out their lifespans with consistent, appropriate care. An industry developed around the development of fish foods, and many species available today were not yet discovered, much less kept and available to the casual hobbyist. It was during this period when much of the standard literature was written as to how to keep an aquarium, its purpose, and what the aquarium hobby had to offer.

Realistic natural environments competed with colorful cartoonish setups provided by businesses set up to meet the needs of the first time fishkeeper. The hobby flourished with what are often called "bread and butter" fishes- guppies, platies, bettas, angelfish, neon and cardinal tetras, cory catfish- the inexpensive fish that you find in most every fish store. With the exception of the livebearers, most of the fish available in the hobby were rarely bred by hobbyists, and for many species, given the husbandry, knowledge and equipment available at the time, it would have been very difficult to breed most species beyond the livebearers and the easiest egg layers.

Eventually breeding efforts were established by the commercial distributors when it became economical to do so. After many generations, selectively bred lines of a number of species were created- fish that had come to breed easily in captivity and were often developed to look a certain way. Raised in large outdoor ponds, they did well in water that was not the cleanest, and could live in tanks with poor or otherwise minimum care. Particularly with new advances in equipment, filters, heaters, foods and well made, inexpensive aquariums, an aquarium could exist for long periods with minimal attention. Soon the casual hobbyist was breeding fish as technology improved, and lines of many species became available that could be easily bred by the moderately skilled hobbyist, given the proper care.

Based on the successes of these early efforts, even experienced aquarium keepers developed beliefs that made sense at that time, but have since been found to be not only untrue, but detrimental for the fish. A certain "magical quality" was ascribed to aged aquarium water, and fish were kept in old water that continued having organics put into it. The survival of many of these early species is a testament to their hardiness, and not necessarily to the technology and advances that were being made at the time. Basics still had yet to be understood- for example, the identity of the nitrifying bacteria present in every aquarium was still not known. It was assumed that a common soil bacteria was responsible, but the actual identity was not determined until the late 1980s!

During the 1970s hobbyists worked hard to breed fish beyond what was being routinely accomplished by the commercial operations, and serious hobbyists explored ways to raise the fry of species that were initially thought to be impossible to raise in captivity. The learning curve was steep, and many long held beliefs had to be reconsidered. This continued into the 1990s, when hobbyists were able to exploit weaknesses in the regulations pertaining to importing fish from other countries, and a great number of new, never before kept in captivity species began to appear in the hobby. Many of these were also rare, or about to go extinct in the wild. Breeding efforts became conservation efforts, and those early successes led to fish being present in the hobby today that have since become extinct in

the wild.

At first, there were losses, as many of these wild fish did not last long in the established aquariums of the time. Many new things were learned. A number of species initially came from streams where constant replenishment of the water occurred with consistent water movement always taking place- how do you duplicate that in a small aquarium?

As knowledge increased, aquarium keepers began to specialize, and broad disciplines emerged where some keepers explored and developed radical new approaches to their slice of the hobby. One example were those keeping plants, with methods specific to different parts of the world- the German approach, The Dutch method, the Japanese method, etc. Discus, Angelfish and Cichlid breeders became commonplace with big fishrooms of bare bottom glass tanks hooked to central filtration systems. Fancy Livebearer fishrooms of hifin swords and guppies came about with their own approaches and rules for keeping fish properly, rules that extended into genetics, disease prevention and even the creation of new morphs, often the result of hybridization and careful selective breeding.

It became common knowledge that clean water needed to be cycled through an aquarium regularly, and that ammonia and nitrate levels needed to be kept at low levels. Mulm- organic waste that accumulates on the bottom- was also found to be a problem by breeders who were developing a new appreciation for water quality, and the factors that contributed both negatively and positively.



With a clean, natural approach, the emphasis switches your aquarium from being an attractive distraction to being a true slice of the wild, with healthy fish that grow to their potential.

Gradually, those in the casual hobby began to change the way things were done, and many of the mysteries surrounding aquarium care became better understood. From having kept aquariums now for over 40 years, I have used every type of mechanical and biological approach to filtration and water quality maintenance practiced in the hobby. Recently, currently running 120 tanks, a consistent, successful, low maintenance method for setting up every tank needed to be established. This setup would need to breed many species in large numbers that were often considered difficult or impossible to raise in quantity. Over time inevitable losses occurred that contributed new knowledge toward the best way to raise and breed these fish, much of which has been posted at selectaquatics.com. After many years, practices and habits have become routine, following what has become an understanding of husbandry specific to the Livebearers, barbs and the catfishes raised and bred here.

First, my goal as a breeder is to raise fish to be at their naturally healthiest. The fish must be fed 2-4 times per day with a variety of foods that best meets their needs. The Livebearers here require some vegetable component to their diet, so I alternate a spirulina based food with a variety of live and dry higher protein foods.

They must have strong immune systems that comes from overall good health, and not having come from selectively bred lines kept in disease- suppressed environments was important. Many fancy guppy hobbyists are aware of this as immune system weakness have been common in some lines.

Basic rules as not to overcrowd, putting species together that get along (or best, keeping single species tanks), and providing standard lighting and heating requirements are followed.

The thinking is that fish have a certain amount of energy available to them, based on their food intake, the quality of the food they are receiving, water quality, temperature, etc. Your goal is to have them express that energy into growth and breeding activity. You do not want otherwise healthy looking fish using their energy fighting other issues- bullying from tankmates, low oxygen levels and occasional presence of disease as a result of overcrowding or a dirty environment.. Even in single species tanks you must keep an eye out for particularly dominant individuals that are impacting the health of other fish in the tank.

With the availability of fish that have not had dozens of years in the commercial aquarium hobby, and the goals of many fishkeepers to keep their fish as healthy as possible, the methods used to maintain a successful aquarium have evolved.

Water Quality: When choosing what type of fish you wish to keep, whether live plants will do well, which plants to choose, and which fish species may breed and thrive, you need to know what your basic water parameters are. This doesn't mean that you are going to raise or lower the pH or hardness. Today, the essential need for water changes means that the water from your tap will be going into the aquarium at about 20% 1-2xs per week. It is far better to choose to keep fish that are best suited to the water you will be using. Besides the difficulty of maintaining good water quality without water changes- if you do alter the water chemistry, it becomes very difficult to keep a consistency that is best for the fish. It is simply easier, cheaper and better for the fish to keep species best suited to your water. So before setting up the tank, get an idea of your pH and hardness, both characteristics that can be easily determined with inexpensive test kits available at your local tropical fish store..

To give you a basic idea of parameters for various species, here is a brief and very rough idea of the importance of water characteristics required by certain species. Keep in mind that many species in a pet shop can be gradually acclimated to their local water parameters, but the fish may not live their full lifespans, and many will likely never breed.

African Rift Lake cichlids require water of a higher pH to do well, and certainly to breed. Many of these cichlids (Lake Malawi, lake Tanganyika and Lake Victoria) fish may require a pH of 8.2 – 9.0 in their tank. South Americans, by contrast, must be provided with softer water at a lower pH- Discus and Angelfish, for example, will generally do well at a pH of 6.6 – 7.0 Livebearers, primarily from Mexico (guppies, swords, mollies and platies generally) prefer slightly higher than neutral pH, around 7.3 – 7.8, while many tetras prefer a lower pH, similar to Discus and Angelfish. Plants, however, do best in softer water of a lower pH- 6.4 -7.8 (depending on the type of plants you wish to keep).

To keep a successful tank you will need to do regular water changes, and the qualities of your tap water are what you will be working with. It will not be necessary to test your water regularly, unless there is a problem that could be due to high ammonia or nitrate levels. Buffers are available from most pet shops that will maintain your pH at another point, but it is an added expense, and in combination with water changes, the pH and must be checked and adjusted on a regular basis to keep the water artificially consistent.

In some cities, water qualities are not consistent throughout the year. For example, in the spring your water department may add algeacides to the drinking water to protect the reservoirs, which are often recognized by aquarists through ammonia spikes in water quality. In some cities the spikes are enough to wipe out tanks of fish after a water change. Calls to the city are generally unproductive. Some fishkeepers will keep water change water in buckets or containers in the spring to let the water "de-gas" before adding it to their tanks when these problems occur. They claim doing so avoids much of the problem, but you may want to test the water before using it during those times of the year, and it is usually over in about 2 weeks. If you are doing regular water changes of at least 20% a week on the tank, the need to test for ammonia or nitrates only becomes necessary if a problem develops.

When setting up the tank:

Choose the appropriately sized tank for the fish you are keeping, based on how big they will be as adults. Also keep in mind that the larger the body of water, the more stable biologically it will be. For example, if a 2 inch fish dies in a 30 gallon aquarium, it will likely not affect the ammonia level of the tank, causing problems for the other fish. However, if a 2 inch fish dies in a 10 gallon tank, and is not noticed or removed before it begins to break down, it could cause an ammonia spike to occur, possibly leading to more deaths. Generally, a larger tank is going to require less attention than a smaller tank, and the potential to provide a more natural environment for the fish is far better with a larger tank.

You want to move the fish once established as rarely as possible. Once the fish are in, let the tank, as a rule, be theirs, as the fish we keep, like all of us, do best in as consistent an environment as possible. The single biggest cause of setbacks in fish ties back to accumulated stress from inconsistencies- in their environment, tankmate changes, etc.

There is also no need to avoid or postpone maintenance out of concern for bothering the fish. The benefits gained from maintenance far outweigh the effects on the fish from the amount of disruption caused, unless, of course, a pair is spawning or their are new fry being protected. Disruption can easily cause a spawn to be eaten. But the fish here enjoy a frequent but gentle relationship with my forearm as it slowly moves through the tank to clean under breeding pots, pleco caves, etc. Over time the fish learn how to respond to your behavior. They see a food container, they come to the front to beg for food, a net, and they all scatter into the plants. Then, removing the top to insert a bare forearm tells them the tank is being maintained, and I am not interested in anyone specifically, so they swim out around my arm without concern. In return, I try not to stir up any debris or significantly alter the layout of the tank unless it is absolutely necessary, and if I remove everything for some reason, I always put the tank back together as it was.

One consideration is to keep the tanks fairly similar in size and setup. With knowledge that the temperatures stay about the same, I will occasionally move fish between tanks that are similar, when necessary.

When the tank is being put together- gravel, decorations, plants, etc., think in terms of "How much biological load do I wish to introduce to the tank?"

A barebottom glass tank with nothing other than a filter, light, heat and the fish will carry very little detrimental biological load, but it is not the best setup. Nitrifying bacterial film will form on everything, so the only bacterial activity occurs on the surfaces of the glass. A sucker catfish will remove most of that, providing an environment dependant on consistent, substantial water changes to provide for the fish. It is possible to keep a tank "too clean". A component of biological filtration must be a part of the filtration of the tank. Some fish, though the water is clean, will not survive long term without some form of biological filtration in the tank. This tank would likely become overwhelmed by excess organic waste fairly easily.

With the addition of sand or gravel, you bring in material that will collect organic matter, and that also increases the surface area in the tank for bacteria to develop. However, if the sand/ gravel is deep enough (about ½ inch) for sand, 1 inch for gravel (or any substrate, soil, etc.), areas that may not be regularly disturbed will become oxygen deprived, and types of bacteria that thrive in that environment (anaerobic bacteria) develop. Their production of hydrogen sulfide gas is the "rotten egg" smell that is evident when cleaning a particularly dirty aquarium, and this gas is toxic to fish. As well, large areas of the tank may be harboring biological activity you may not want or need, and that the fish must expend energy to accommodate through disease resistance, possible lower oxygen levels, etc.

So gravel can be used to supplement natural filtration through the positive introduction of nitrifying bacteria. The gravel must not collect mulm, or be deep enough to develop anaerobic areas. Other scientific facilities have been using this principle to maintain healthy fish and tanks for many years. Because I strive for a more natural look to my tanks, I will sift standard pea gravel through a ¼" steel fence mesh, and sprinkle the ¼" or larger stones across about ½ of the bottom of the aquarium, 1 pebble deep. Any gravel large enough so that it will not collect mulm, or such that any detritus can be seen easily and siphoned away will work. This will be the substrate. Painting the outside of the bottom of the tank, or covering it with a dark material contributes to the fish being more comfortable, and it also subdues any reflection or glare from the spots where the bare glass is evident.

A tank following these principals can be set up to look just as natural and attractive as any tank with an inch of gravel. But primarily, it is much better for the fish. Maintenance is easier for you, and incidences of disease will be infrequent. When there is a problem, it can be easily identified and remedied as the tank is set up simply and portably .

Filtration can become fairly complex, when in fact a well kept, maintained and under control tank environment will require filtration provided by the simplest and most inexpensive of filters. Simple 1960's era box filters are used here (made and sold by Jehmco) filled with polyester floss, and weighted with inert, glass marbles. The floss is then changed monthly. Regular water changes, a substrate of a single layer thick ¼ pebble gravel over just half of the tank, and lots of live plants complete the filtration process.

Types of Filters:

No Filter at all- A tank can be maintained with aeration (an airstone), live plants, light, regular water changes and a low number of fish. Aquarists primarily focused on plants have explored many ways to maintain aquariums using plants, water changes and low fish load as the only means of maintaining water quality. The concept is great when well maintained, or when the lack of active filtration is the focus of the tank, or its function requires a lack of filtration. Anabantid pairs (Bettas and Gouramis) are often bred in tanks without filtration and lots of plants. This provides a natural environment without the surface turbulence that interferes with their bubble nests. This has its advantages if you are willing to spend more time and effort, but you may need to keep fewer fish than you may want.

Under gravel filters- Composed of a plate that lies below the gravel, it revolutionized the hobby when first introduced in 1955. It uses the assumed 1-2 inch gravel layer on the bottom of the tank as its filter medium. Uplift tubes pull water through the gravel down to a slotted plate and back into the aquarium. Unfortunately, to fully clean the gravel, you need to tear down the aquarium. The result is that most tanks go neglected with occasional gravel siphon jobs until dirt collects to toxic levels in the gravel. The gravel is often exposed by the fish by digging, negating its effect on the rest of the tank. Then, when a fish gets below the plate, the tank must be taken apart to retrieve it. Lastly, plant roots do not do well over an ungravel plate, and plants do not last long when planted over them. Today, few aquarists setting out to put together a clean, healthy tank do so with an undergravel filter.

Inside-the-tank box Filters- Admittedly, a very "old fashioned" type of filter, they are actually one of the most effective, simplest and easiest to maintain. There are no moving parts, and filters that are 30 years old work as

well as the day they were bought. And they are inexpensive, at generally under \$10 each. But because they have given way to far more elaborate types of filters, box filters are rarely seen, and only available online through vendors such as Jelmco. As well, box filters are not especially attractive for a tank striving for a natural appearance. But their cost, ease of maintenance and durability make them a favorite of serious breeders.

Hang-on the side Filters- These are all generally fine, as long as they are kept relatively clean, and the fishkeeper does not mind paying for premade cartridges. The issue becomes how big of a unit do you need? Generally, a filter that runs the tank volume at least 7-10 times per hour is good. You cannot overfilter an aquarium. The limiting factor is the strength of the output. You don't want to put a filter on a tank that disturbs the tank to a large degree- water movement for some species is fine- fish from moving streams may even require it- but as a rule the filtration does not need to be so strong that the fish must find refuge to avoid it. There must be large calm areas in the tank for the fish to be able hang out comfortably.

Sponge Filters- These are great for introducing biological filtration to an aquarium. When raising egg layer fry they can't be beat for providing an area for the new fry to feed on microorganisms. However, they do not remove mulm or particulate matter, and are not meant to collect a tank's wastes as other filters do, yet they are often used for that purpose. With consistent tank maintenance to keep the tank free of decaying matter, a sponge filter could be used, but in my opinion, they are not suited to be the main source of filtration. They also deteriorate over time, and the sponge material will often separate from the stem it is covering, compromising the flow of the filter.

Canister Filters- The most advanced types of filter systems are often canister based, where a round canister sits below the tank in a cabinet or otherwise out of site. With an understanding that a leak could possibly empty water on to the floor, unless precautions are taken, and a willingness to spend the money, they can be an excellent choice. One type used often is the HOT Magnum 250 canister filter- which hangs on the back of the aquarium, and the siphoning of water to below the tank is not necessary.

Aeration- Whether you choose to provide active aeration into the aquarium depends upon the species you choose to keep. The majority of commonly kept fish do best with some type of active aeration, and many species require it. The livebearers and barbs at Select Aquatics do best with active box-filter aeration, but cichlids about to breed may not do well in a tank with excessive water movement. Aeration stimulates bacterial activity, and generally is a very positive introduction to a clean, healthy aquarium.

Light- 10 to 14 hours a day of lighting will not only support and provide for any live plants in the tank, light also helps maintain healthy levels of beneficial bacteria in the tank, improving water quality.

Heaters- A heater is not required for every species kept in all fishrooms, but a quality heater that works predictably is essential for most commonly kept fish. Unfortunately, I do not believe that heater technology has kept pace with improvements in other equipment in the hobby. Still quite expensive, rarely are they accurate, and often they do not last longer than 2-3 years. Some fishkeepers routinely replace all their heaters yearly to avoid accidentally cooking or losing fish to disease from being chilled, which is an expensive habit to get into.

Some hobbyists are using new technology and inexpensive probes that connect back to a computer program. Similar to the type of programs available for home security to monitor temperature in various rooms, programs have been adapted to maintain active supervision of the temperatures in a fishroom's tanks. A friend with a 30 tank fishroom can access graphs of the temperature of every tank- taken in 5 minute intervals- from any time period, up to the present, with his cell phone. When the temperature in a tank passes a preset threshold, he receives a notification on his phone. Unfortunately, there is nothing available yet to purchase, but home security systems may be fashioned to meet this task.

Lights- Tube fluorescent aquarium lighting is no longer the only choice, and in many circumstances other types are better with regard to electrical usage, heat given off and even the quality of the light they emit. Inexpensive CFL bulbs are proving to do a very fine job with aquatic plants (The daylight 60s), last many times longer than standard fluorescent bulbs and cost less initially. LED lighting is still getting a foothold, and once the initial prices come down they will likely set the new standard for aquarium lighting.

Foods- Your success with any species, especially if you hope to breed them, is your feeding regimen. Commercial dry foods today are of excellent quality and able to provide the basic nutrition to keep the fish healthy. Feeding a variety is best, and the species you choose to keep may have dietary needs. For example, feeding African Rift fish foods too high in protein can easily cause bloat, avoided by feeding a vegetable based flake or pellet. But if you wish to breed your fish, and as well to raise the young, you should provide at least a live or frozen food, such as Brine Shrimp or Blackworms. Hatching baby brine shrimp is very easy to do and many methods can be used. You will generally not be able to raise up newborn fry without it.

Medications- A well run aquarium should not be expected to encounter disease on a regular basis. In fact, diseases are encountered very rarely, and often as the result of an introduction of a new fish from outside the fishroom that was not quarantined properly, or problems that were the result of inconsistent maintenance.

However, when a disease does occur, you want to be prepared. Fish diseases spread quickly, and generally one must act immediately when a disease situation is first noticed. When ich (white spot disease), or a fungus or rot of some type appears, I will add 1 tablespoon salt for every 5 gallons of water in the tank, usually combined with raising the temperature a few degrees. This may alone cure the problem, but if not, it does provide time- a few hours to a day- to purchase a medication specific to the malady that is being treated. Having a basic ich treatment medication on hand is never a bad idea.

Place any driftwood or whatever you wish to decorate the tank with, keeping in mind that anything put in to the tank should be relatively easy to remove to clean behind and around, etc. Floating plants such as Java Fern, Bolbitis Fern, Java moss, Najas grass, etc are used, as well as Amazon swords, Vallisneria and saggitaria. Various Crypts and Anubias are also used, in pots either in the open or hidden behind other objects. They are filled with peat and gravel, such that they can be lifted out easily. I have found, however, that bacterial issues will come about after approximately a year, so that all pots have their soil mixes replaced yearly. The same thing will occur in a soil planted tank, but changing the soil and putting in fresh is done in minutes, and the tank can be almost entirely cleaned when the pots and plants are removed.

The point is to introduce organic material to the tank as you feel is necessary for the maximum health of the fish, as opposed to fighting an environment that collects waste. As well, by keeping a tank in this fashion you are maintaining far better control over the variables that contribute to problems, as opposed to a confined setup where much is going on, and various, generally minor problems occur a few times a year. The fish may appear healthy, but they may not breed or grow to their maximum. As my goals tend toward maximum growth and breeding, your preferences may incorporate a mix of approaches- you can decide based on how pleased you are with the fish you are keeping.

When to Introduce the Fish- The fish can be put into the tank after a few issues are taken care of. Keep in mind that the fish should be put into as close to an established, clean tank as can be provided. The tank itself should be constructed in its final form- decorations or whatever put in place, etc. Water needs to be added carefully. If at all possible, combine clean established aquarium water from another aquarium into aged or dechlorinated tap water to help cycle the tank. The aged, established aquarium water should contribute 10-30% of the new tank volume. Running the tank for a day with the tap water can help assure the water is ready for the fish, then add the aged aquarium water. Once that is done, and the temperature is correct, the fish can be added to the aquarium. Be careful to adjust and acclimate the fish slowly, both to the different water quality than where they may have come from, as well as the temperature of the water. Generally, put the new fish into another, smaller container with the water they came with, and then, over a period of 1-2 hours, gradually add a little at a time of your water to slowly acclimate them. Once the majority of the water is the water they are going into, then float them in a plastic bag for 10 minutes or so to ensure the temperatures are the same before releasing them into the tank.

You want your setup to be:

- Best for the fish
- Easy to maintain consistently
- Pleasing to the eye
- As simple as possible
- Clean and neat while natural in appearance.

Your ability to maintain complete control over the variables that can cause problems is important. Know about the water coming from your tap- its pH and hardness, and test as it may change seasonally depending on the addition of chemicals and algeacides by municipal water systems.

The fish will not mind your occasionally sticking your hand in slowly to move something to check behind it, or to siphon up mulm from the bottom, when your movements are not quick or threatening

Water changes of at least 20% weekly are essential, twice a week is best.

Regular quality feeding 1-3x per day of a variety of quality dry and live foods helps to ensure best health.

An inch of fish to a gallon up to about 3 inch fish works fairly well. Fewer fish is always better. After 3 inches, larger fish need more tank space.

Live plants are best if they will thrive in your water. If you have pH of 6.0 to about 8.0, and medium to soft hardness you should be able to keep many types of plants.

Know what the temperature should be, and check with a thermometer on a regular basis.

Keep in mind the natural preferences of the fish you choose to keep. If they are normally cave dwellers, provide appropriate hiding spaces in the tank. If they prefer to hide in the plants, do not take the plants out. Spend a little more time at the tank, possibly feeding them a little each time you visit, so they will respond to you, and you can gauge their health by their behavior.

You do these things, and your fish will thank you for it!

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