

3 Periods of Fish Adjustment to New Environments

There are a number of concerns when moving fish from one environment to another- we are asking a lot for a fish to adapt immediately to a new setup in a new tank in a different place, where the tankmates, the water quality, water movement, filtration type, feeding schedule, ambient light and seasonal cues may all be different. Over many years of breeding and working with a number of less commonly kept species, I have found that to best determine whether a species will do well in my water and setup, there appear to be three acclimation periods to be concerned with in any successful introduction and acclimation to a new environment.

An awareness of these three acclimation periods and how they play themselves out may be the single biggest reason some hobbyists claim they are unable to maintain certain fish, and certainly why some claim that a fish cannot be bred. The initial introduction when you first bring the fish home is the most critical, but there are two other, longer term adjustment periods- mostly to your water quality, that most fish have yet to go through once established in your aquarium. This is added to any other acclimations they must make to thrive in your tank, such as getting along with tankmates, etc.

After the initial introduction, the second acclimation takes approximately 4-5 months, and the last may not take place, for some species, until the 3rd or 4th generation. This last acclimation becomes very important when breeding a species that has been difficult for you, or when predicting possible breeding success with a species for the long term. (Longer than just one or two generations).

Based on experience maintaining and breeding livebearers, where lifespan rarely exceeds 4 years, the timing of the acclimation periods may vary for other longer lived fish. In other species, the process could differ by being either shorter or longer.

The First Acclimation:

Initially acclimating a new fish to your aquarium:

With the initial introduction there is more to the fish's acclimation than the temperature of the water, and with a species coming from different water parameters this acclimation process can take a couple hours. At a minimum the process should be done slowly if you wish for the fish to do their best. The fish is experiencing disruption on a health threatening level- to just "dump" the fish into the new tank is introducing stress at a time when the fish can least cope with it. To then have to deal with interactions to new, strange tankmates on top of that can easily be fatal to many less hardy fish. There are two ways to best accomplish this initial acclimation:

The "Drip Method"- Used by many aquarists, the fish after arrival are placed into a container that will hold the fish and the shipping water they came in. 1/4" airline tubing is set up to siphon from a container holding clean aquarium water or from the aquarium they are planned to go into. An air valve is the put on the end of the airline just before the container the fish are in and a siphon is stated. The air valve is then adjusted so that a single drop of your aquarium water then drips into the old shipping water no quicker than about 1 drop every 3-4 seconds. When the amount of water in the container then doubles- so that half is your water, half is the shipping water, then remove about half of it and let it continue, doing this a couple more times. Watch carefully throughout the process for any distress in the fish- if they start swimming in quick spurts or appear in distress, jumping from the water, gasping at the surface, resting on the bottom without energy, then stop the dripping immediately. Possibly add an airstone with a very light air current, and then do not add more new water for at least 30 minutes, depending on how well the fish recovers. It should take at least 45 minutes to an hour before you have the fish in 100% new water. Then, put the fish and the water into a container (or a bag) that will float in the tank to acclimate the temperature. Leave them floating for at least 10 minutes for the water temps to equalize, before letting the fish go into the tank. During this time I will also feed any other inhabitants of the tank well, so their stomachs are full when the new fish are introduced to the tank. This will hold down any chasing, possible fin nipping, etc.

"Drip Method" revised- This is the method we use here. After using the drip system for many years, I began to simply put the new fish into a container with the water they had come in (sometimes the container may need to be angled if there was not much water), and would add a small amount of new water- a tablespoon or two- about every 15-20 minutes at first. Do not add more water if the fish are showing any distress, and wait until they appear fine again before adding more water. When the water they were in had doubled, I would start adding water more frequently and in greater quantity. Eventually I would start removing water, and once they were in nearly all new water I would then float them in the container, or a bag to even up the temperature before releasing them into the tank.

I also use this opportunity to give the new fish a good meal of brine shrimp or food they will eat while confined to the smaller container before releasing them into the tank. This way they too go into the new environment with a full belly to better handle

the adjustment. Some fish are shy when introduced to a new tank, and may choose to spend the first couple days hiding in the plants before coming out to eat, feeding them well beforehand helps ease the transition.

With all new fish, it is best to keep them in a quarantine tank first by themselves so that any pathogens the new fish may be carrying cannot be spread to the new tank.

To also help ease the transition into their new environment, leave the light off the first day, and provide some plants they can hide in to feel secure.

Acclimation #2

When adding new fish to an aquarium, the long term adjustment to your water conditions may be more than some fish can tolerate long term, particularly if the fish is fully adult or older, and had lived its life in different water conditions. Younger fish are able to adjust to new water qualities more easily, and show fewer long term effects to the adaptation to new water. Older fish, depending on species, and dependent on the amount of difference between the two water qualities, will sometimes age more quickly and experience a shorter life span as a result of the second adjustment period that takes place from approximately day 2 in their new tank, extending out to about 2-3 months.

Because you do not know how long a new fish will survive in its new environment, the goal with any group of newly acquired adult fish is to get them to spawn as quickly as possible. In a sense, a gravid female is as important as a group of older fish- the adults, due to the stress of the long term acclimation and change in surroundings, may not survive more than 4 or 5 months after arriving in your aquarium. It is always nice to have adult fish on hand to see what any fry will grow into, but realize that your original fish may not be as hardy as those that have been born and raised in your water.

The first fry born will be far ahead in the acclimation process, more so than their parents could have been. These are the first born in your water, so they need to be well taken care of as they will be the future of that species in your tanks.

The majority of the species you will keep in your tank, particularly if they are commercially produced with a long history in the pet trade, should adapt well. Their lifespan may be only minimally affected, particularly if the fish had come from water similar to your own. However, if your intent is to get maximum size, color and breeding success from your new fish, any lack of success may be tied to the fish still adapting to your conditions.

This second acclimation period is when the greatest mortality occurs, and when many factors that you cannot control will influence their survival. The older the fish, the greater the influence their previous life history, current overall health and changes in their daily routine will play. These changes include a possibly different diet, feeding and light schedule, possibly higher or inconsistent ammonia and nitrate levels, pH and hardness differences between the old and new water, the activity level of the tank, and new tankmates, all playing into any prediction of how close to a full life the fish will continue to experience.

The most effective means of speeding up this adjustment period, and to work toward the best outcome is to provide them with an environment that provides minimal stress, allowing the fish to be comfortable. Feed regularly with quality food, while maintaining good water quality. Feeding smaller amounts of quality food often is better than feeding a large feeding once a day. Consider keeping only medium bright light, and provide plants that the fish can hide into occasionally to feel secure. Remove any aggressive tankmates, and try to keep at least a pair or trio to get the longest lifespan from your new inhabitants. Maintain good aeration and keep up on water changes of at least 20% a week.

But there isn't much that you can do beyond effective husbandry, as the differences in water qualities the fish had to experience cannot be changed. However, the fish will better adapt generation to generation, and this much longer acclimation can take 2-3 generations, and is the third adjustment some species need to make before they become fully accustomed to your water qualities.

Acclimation #3

The goal of any aquarist is to find which species will do well for them- which will grow well with good color, and will breed as they should. The third acclimation is of most concern for those who wish to raise the fish and keep that species for many generations. Whether your fish will do well in your tank is tied to your basic water quality. This third acclimation is the most important, and is determined to have passed, often into the third or fourth generation when they begin to reach their full size, live a normal lifespan, and most importantly, have large broods of fry that grow out and do well.

Most fish can adapt to a fairly wide range of water qualities. In any pet store, where all of the fish are kept in the same water, the fish are from a variety of water conditions. Some stores may buffer their African tanks, but generally all of the tetras, barbs, livebearers, catfishes and most cichlids are kept at the same pH and hardness. Many fish will not breed, live a full lifespan or reach their maximum size if their water quality is too far from where the species originated. Anyone who has ever worked at a pet store knows the need to remove dead fish from the bottoms of tanks the morning after new shipments arrive, as a result of the adjustment to another set of water qualities. But feeding normally, and appearing to thrive does not mean that the fish will breed in those water parameters.

Once the fish has acclimated well enough to the new conditions to appear healthy and comfortable, acclimation

to the other variables that differ from their previous experience continues. This can take 2-4 months, and soon the fish should breed. If they do not, there may be some continued resistance to your water quality. You may see small broods, broods that are not entirely healthy, or batches where a portion are stillborn.

The healthiest of those young are then grown out and bred. Generally, after about the 3rd generation, the batches of fry will approach normal size, and they will begin to appear healthier and more robust. Those fry will be the first that have truly acclimated to your water.

Generational time differs between species. For guppies, the generational time used by breeders preparing for shows is 4 months. Herbert Axelrod mentions in his book "Fancy Swordtails" that the generational time for the swordtails and platies they were using in their breeding efforts had a generational time of 8 months.

Fancy guppy breeders encounter this multigenerational acclimation frequently when obtaining a new line from another breeder. Those new to keeping expensive guppies will comment that the young fish they bought did not grow as large or as colorful as their parents at the original breeders. Then their first generation rarely looks as nice as the original fish. They chalk it up to the superior fishkeeping skills and foods fed at the breeder's. However, if their water quality was different enough from where the fish had come from, the fish may need 2 or 3 generations before their fry become consistent and of higher quality. With guppies, quality is large size, vibrant color, exaggerated finnage and vigorous activity- all affected when a fish is continuing to adapt to the water they are kept in.

Guppies will breed once they are fairly well acclimated, as will many other species that are not difficult to breed. But many fish cannot be forced to adapt, however gradual the process, such that they will one day breed. As well, specific water qualities may be essential to the survival of the fry- the egg membranes may require pH and hardness within certain limits, depending on species. Many fish simply do not experience the natural responses to breeding cues when the water quality is not what it should be for their species.

In northern California where I once lived, water from the tap was at a pH of 8.2. Angelfish and discus, for example, that require a pH below 6.8 to breed could be bought apparently healthy from any pet store, but they would never breed in water so far from their preference.

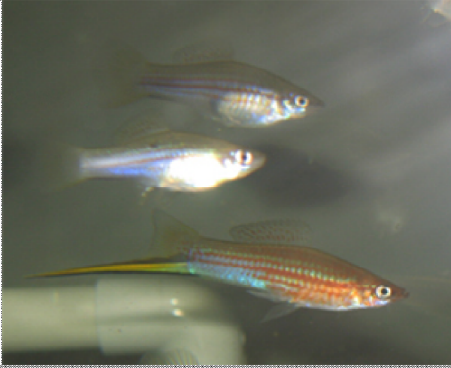
A recent example illustrates this process. The fry of 3 wild caught pair of *Alfaro huberi* were given to a friend to develop about 5 years ago. It took those pairs many months to drop small batches of undersized young.. This fish gradually increased its numbers by just a few fish, year by year. A pair raised from the second generation I had given him then had a full sized batch just this fall. It was the first time he had more than 15 of these fish in 5 years! Those young are full sized and should now do well, having regular sized batches of fry of their own in the future.

In 1998 I obtained my first 2 pair of *Zoogoneticus tequila*. They did not reproduce well, and ultimately, I needed to obtain groups of 2 pair three more times before young were born in my water that thrived. Today the *Z. tequila* is raised by the hundreds, and is one of the most prolific fish in the fishroom. But it took a couple generations for them to fully complete their acclimation.

Currently there are three species going through this third acclimation in the fishroom here, and it is expected that 2 or 3 more years may pass before they begin to reproduce in large numbers, as well as to reach their full size and color. One is *Xiphophorus clemenciae*. This fish has a reputation for being difficult to maintain, with some discussion that certain populations are more challenging than others. The fish I obtained were not wild caught fish, and the water qualities they came from were not known. The issue of the third acclimation with this fish is clear, as it is believed by many aquarists that the F1s of any pair of this species will not be fertile. This is the third acclimation at work- when the young of the first generation born in your water reach breeding age, they may still breed slowly with smaller broods until at least another generation has passed. As a result, many supposedly knowledgeable aquarists insist this fish is not fertile past its first generation, which is not true.

The *Xiphophorus clemenciae* is a spectacular fish and the original adults were full sized 3.5 inch fish. (The *X. clemenciae* is one of the smaller wild swordtails). However, as can be seen in the picture below, many of the young of the first generation are undersized. They are healthy and robust- they are fed 3-4xs per day with daily 15% water changes- but will likely require another 2 generations before the majority of the fish in any spawn are full sized. The *X. alvarezii* is an example of a full transformation. The original fish were obtained about 8 years ago and were about 3.5 inches, and bred consistently, with small batches of young that were undersized when compared to most swordtails. Over time, the smallest males that were early maturing or undersized, fish that could neither be sold or used as breeders were removed, and no other manipulation of the line took place. Over time the original wild line improved through adaptation and optimal care. A pic of a male taken in 2012 shows the improvement in body size and color that has taken place.

One fish kept here will not breed, and this multigenerational acclimation may be to blame. So while a few pair are being waited on to breed in other tanks, young fry obtained from another fishkeeper are being grown out so they may spawn when they mature, after having been raised in this water. Depending on how badly you might wish to breed a particular fish, this process to get a spawn may take a number of months or years to accomplish.



These *X. alvarezii* were obtained in 2005, and this pic was taken of the first generation



This is the same wild line in 2011 after 6 years. Some selection for healthy, larger fish occurred, but acclimation to the water quality played an important role.

Whether a line having been through an acclimation process before will ease the process with following generations is not known. There are certain steps some aquarists take to help overcome or speed up the third acclimation, and various strategies can have varying success. The thinking with these other approaches is to raise successive generations in water that does not inhibit growth, and may be in fact better suited to them than the water quality they had come from.

From having been moved around to various aquarists, many hobbyists never keeping a species more than one or two generations, it is unknown if a fish coming from an established line, long kept in one set of water parameters, will experience a quicker or longer acclimation when introduced to yet another set of parameters.

The first potential solution many aquarists employ to get past this third acclimation is to use RO (reverse osmosis) water, reconstituting the water to exactly what you feel the fish needs. The benefit to the fish can be dramatic (depending on the choices made by the aquarist). But the fish run into problems when moved into a normal water setup, and often do not last long, for example, when the fish are shared with another aquarist that does not use RO water. But moving them to water best suited for them, regardless of their previous conditions or the quality of the water coming from your tap has merit. Some are successful by breeding the fish in what is hoped are optimal conditions, then gradually adapting the young to treated tap water as they are prepared for sale or to be kept in another aquarium with different water qualities.

A second method used is the addition of salt- a medicinal dose of 1 tablespoon per 5 gallons of water- to the tank to ease the adjustment to the new water quality. Most freshwater fish do better when salt is added as it suppresses many freshwater pathogens the fish's energy confronts, but salt has its disadvantages. Few plants do well in a tank containing salt, and it can require cleaning that can be difficult. And again, unless the next aquarist to own the fish also uses salt, the fish may do poorly if the use of salt is suddenly stopped. salt does not speed up or even affect the adaptation to your water, but it does boost the fish's ability to fight off infections or diseases that can take advantage of the fish's condition.



These *Xiphophorus clemenciae* were only recently acquired, and have shown that while

healthy and breeding well, They are slightly undersized this first generation born in the water here.

The end result is that a fish recently acquired by Select Aquatics, for example, will not be ready to sell once the first batch of fry reach sexual maturity. All of the fish here have been maintained for many years, so that fish shared and sold are consistent and ready to best adapt to your aquarium conditions. In some cases a fish may be maintained and bred for more than 1-2 years, before a decision may be made that it will never adapt well enough to be sold, and it will be discontinued.

Producing the best quality fish is accomplished with concern for what the fish is being exposed to, and patience for the fish's system to adapt physiologically to your water- which may take a number of generations for some species, depending on the water quality where the fish does best, and what you are able to provide. The practices of any fishkeeper, then, is to try a number of species, and find which do best over the long term in your conditions. The water available to you from your tap does dictate which fish you can keep, and the fun is finding out which species in the environment you provide are able to live closest to natural, full lives.

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