Fish Stress and Disease Overview

This article concentrates on the practical considerations relating to the health of your fish in the real world of aquarium keeping.

Although one may think otherwise, the problems our fish encounter in an aquarium are not the same as they would encounter in the wild. Although the parasites and bacteria will be the same, in most cases these disease agents do not create the same problems in the wild.

The first and major difference between captive fish and fish in a native environment is the sheer volume of water that each fish has access to. In nature this enormous volume keeps the disease agent ratio at the low end which provides the opportunity for a fish's natural defenses to maintain health. It is really due to the fact that fish an aquarium are in a closed environment that various disease agents can multiply into such numbers as to cause widespread disease and loss.

In nature when any of the normal background parameters, e.g. water temperature, pH, alkalinity, purity, oxygen content, etc., suddenly change then the background pathogens, or parasites, will become very active as the fishes immune system becomes weakened. This weakened condition and lowered resistance to disease is due to environmental stress.

Stress is the greatest cause of fish disease.

In nature, when the prevailing conditions are ideal, only the occasional fish, usually an older one, will become ill. Natural selection takes care of such fish as the become food for predators or scavengers. This survival of the fittest rule ensures that infections are not passed on throughout the population and the infection potential is kept at a minimum.

The ability to recreate environmental conditions which minimize stress is of vital importance in maintaining good fish health.

Furthermore, in nature fish typically have a large range of organisms to serve as food, or at the least such organisms as they have evolved to find suitable, as a complete food for their growth, reproduction and good health.

Compare this to the typical diet we give in an aquarium, which has on average some 10 or more different species of fish, each of which in

nature will predate upon different organisms to grow and become healthy, & we feed them *one size fits all* the same packet of food, day in & day out, with little regard to their individual requirements.

Is it any wonder that the combination of these factors result in high levels of stress? This, given other factors to be discussed, can & does result in the fatal outbreaks of disease that are the cause of so many aquarists eventually giving up the art of successful aquarium keeping.

Let's consider just a couple other factors that can produce stress.

Let's begin talking about photoperiod (how much light/dark fish get each day). Most aquariums lights are turned on in the morning and turned off when we go to bed. For some this is 15 hours, for others it can be up to 20 hours. And most lights do not turn on gradually, they turn on fully. Fish and plants need roughly equal periods of day and night (If you want to get real specific the proportion of day gets longer in spring and summer, and shorter in the fall and winter of the fish's native environment).

Another big stress producer is water quality. Fish in the wild benefit from an almost constant turnover of water. Consult one of the many books on aquarium keeping and you will get a rule of thumb something like "Change 20%-25% of your aquarium water monthly". Good advice but this doesn't even get close to duplicating what nature can do (and by the way, when was your last water change anyway?).

There are certainly other stress factors we could discuss but the main point to understand here is that organisms in a closed system are going to be stressed from time to time, and that these stresses manifest themselves in weaker immune systems and, unfortunately, disease outbreak.

In other articles we will discuss the specifics of a variety of diseases but let us talk now about the similarities and differences between the aquaculture industry (commercial fish farming) and the aquarium hobby.

In aquaculture it is normal to rear just one species in a pond or tank. Occasionally farmers practice Polyculture (the keeping of 2 or more species side by side), but this is not common, & even when it is the practice, it is very seldom more than 2 species.

It is a rare aquarist that keeps only one or two species, in his or her aquarium.

For the aquaculturist, this means of course he has a much higher risk if disease should break out, as many pathogens, whether parasitical or bacterial in Nature, often have a preference for a species, and can spread very quickly. On the other hand the aquarium usually has many species which mean that some diseases at least will not spread as fast, and give the aquarist a chance to get the problem under control.

Because of the enhanced risk, good Aquaculture practices, require the fish farmer, to pay constant attention to water quality, disinfection procedures, and the continuous observation of his stock, as any lapse can bring about serious losses, which after all are his livelihood. For this good reason today more and more farms are employing trained Biologists to manage the farms, and try to keep the risk of disease under control.

Today many more Aquarists, also pay close attention, but as it is a Hobby and not a source of revenue, for nearly all of us, the degree of close observation & the amount of control equipment is understandably less than on a professional farm.

Another difference on many farms, is that the water body is constantly changing, taking away pollution, and renewing the quality of the water. This prevents the accumulation of undesirable "metabolites" which are most often Nitrates, Phosphates, Proteins, and more. This cleansing of the water body in Aquaculture is vital, as any degradation of water quality, can very quickly give rise to stress, which can quickly help bring latent parasites, viruses, or bacteria, into a chronic state of infection.

Many Aquarists do of course also change water, many do not do so, or if they do it is infrequent, and anyway, even the best of us, do not do so daily. This means that we must rely on more sophisticated control methods, such as Protein skimmers, Ozone generators, UV purification, Biofilters, and much more in the form of water additives etc. For those of you who have taken the trouble to understand the reasons for such technology, and can measure the effects, this can and does yield some excellent results, such as wonderful Reef Aquariums, as well as beautiful planted fresh water Aquariums.

The lesson to be learned is that many things can cause stress, and that we should always seek to lessen this by understanding the

underlying reason, and that if we do, we can greatly minimize the problems that all too often occur.

The following lists some rules which are worth repeating for those who may not know, or have perhaps forgotten, all of which will reduce stress & therefore reduce the eventual possibility of disease.

1. When buying fish from your local dealer, try & ensure that the specimen you select, has been at the store for a least a week and see it is feeding. Perhaps pay a deposit on the fish and ask the dealer to keep it a few more days. Most good dealers will gladly let you place deposit on a desired specimen.
2. When taking a fish home, ensure that the clear plastic bag is placed in a paper bag. Nothing will scare a fish more than being trapped in a clear bag, from which it cannot escape, & seeing all the strange sights moving past.
3. Ensure that you equalize the water temperature, as well any pH differences SLOWLY, over at least half an hour, by the slow addition to the bag of the tank water, & floating the bag first to balance the temperatures.
4. Add the fish in as subdued a light as possible, and DO NOT turn on the lights for the rest of the day, to view the fish, which although a natural inclination, should be resisted in the interest of longevity for your new fish, and even the old ones.
5. Ensure in both fresh & salt tanks, large numbers of hiding places, so that the fish can find a new "home" and feel secure from any perceived enemies.
6. Avoid tapping the glass, to try & bring the newcomer out from any hiding place, when it has adjusted it will display itself to your content.
7. Work with your dealer to make sure that the new specimen(s) you are considering are compatible with those you already have. Some fish are naturally antagonistic to others. For example, two similarly sized marine Angelfish of the same species will often fight to the death.
8. Do not overstock the holding capacity of your tank, crowding will induce stress very frequently, & can cause a total wipe out in some cases.
9. If you have burrowing fishes, such as Kuhli loach in fresh water, wrasses or some gobies in salt, ensure that the type of gravel you are using is suitable, as some are sharp & can quickly cause abrasions which will lead rapidly to the demise of the fish, & perhaps spread to others.

10. Avoid suddenly turning on lights in a darkened room, as this unnatural shock can cause many fishes to jump out of the tanks, Swordtails are great at doing this. If you can, turn a light on in an adjoining room to slowly wake your fish up.

The practice of these basic rules will help towards the goal of keeping fish more in harmony with the natural condition, to help reduce stress and the likelihood of disease.

Today throughout the world, fish are been bred in captivity for food in most cases, but also for our Hobby. It is a fact that today, a very large percentage of the fish we enjoy watching in our home Aquaria, have been bred in captivity. This is a far cry, from the early days of the Hobby, when almost 100% of the fish which were sold, came from wild caught supplies, in many countries.

Although there are similarities, between the environments in which Aquaculture maintains & breeds its fish, to those we create for the home aquarium, there are also important differences, & in order to better understand, how fish may be stressed & become ill, it is useful to be able to make such comparisons, which are set forth in the following table:

FISH LIVING IN	IN NATURE	IN AQUACULTURE	IN AQUARIA
Many kinds of fish	Yes	No	Varies
One type of fish	Never	Usually	Almost never
High density	No	Yes	Can vary
Ideal water	Yes(for the most part)	Mostly, not always	Variable
Good husbandry	Not applicable	Usually	Variable
Subject to predators	Yes	Only at juvenile stage	Seldom, but can be
Natural food	Yes	No	Rarely
Water changed often	Yes	Generally	Variable
Subject to stress	Yes, but only natural	Stress by crowding & more	Depends upon skill of Aquarist

By looking carefully at the short list and noting the differences between keeping fish in an aquarium and fish in nature we can see that here are indeed many potential stress points. As previously

stated, it is these stress points that suppress the immune system of your fish and allows disease to take hold.

Some of these key points include the following:

Diversity

In many aquariums it is usual to find a few to many kinds of fish, and unfortunately due to poor advice or no research incompatible species are placed together. These fish will become very aggressive to others, & will cause stress to other fish, which can quickly result in disease breaking out.

Density

Most aquarists are knowledgeable about space requirements but occasionally we find too large of species kept in too small an aquarium. This results in added stress and again the high likelihood of disease.

Water quality

In Aquariums we today have the technology to control water quality to a high degree. Notwithstanding this, for a large number of good reasons, the water quality from aquarist to aquarist varies in large degree, from superb, to abysmal. Among the myriad of reasons are, lack of good advice from the dealer, lack of adequate funds to purchase some of the essential equipment, and poor water quality at the source. Those with high water quality in their aquariums will encounter a much lower level of diseases, while one can be sure, that those with lower water quality will have the highest incidence of disease outbreaks. One can also say with certainty that many of the aquarists who quit the hobby, do so because they have lost too many fish due to disease. It will help everyone to be successful, if we can try together to reduce disease, & improve where necessary the water quality.

Good husbandry

Just as with water quality, good husbandry practices will help keep disease at bay, while poor husbandry is simply asking for problems. Daily visual checks of fish and equipment are just the basic first steps of a good husbandry system. The less attention paid to the aquarium,

the poorer the fish tend to do. Again, stress and then disease take their toll.

Natural food

Aquarium use of live food is highly variable. Most good shops carry one or more varieties of live foods, & a large number of serious Aquarists buy such on a regular basis, & some others, culture or collect their own. The use of such foods is important, and in some cases vital, as there are fish that will never touch a prepared food, such as leaf fish in Freshwater, Seahorses, & Lion fish in Saltwater & many others.

Without such additions to their diet, many fish will progressively weaken & become prone to disease. This can be avoided, by choosing a suitable live food & feeding it regularly, although it is often difficult to ensure without a great deal of trouble that the fish that need the live fish most, get to it. Too often other faster fish have eaten all or most of it, while slow moving fish like those mentioned, have not gotten any of it.

An alternative is either to avoid these live food eating species altogether, or keep them only in a tank to themselves. Some hobbyists will do this, and ensure that a number of pregnant female guppies are always present. These females will eat almost any food, while the continuous supply of offspring will provide a constant live food diet to those that will eat nothing else. Hobbyists should be aware that Guppies can be kept in full saltwater, and will even breed, if the "change over" is done gradually over a few days. While large Lion fish will also eat the parent stock, Seahorses will not look at an adult female, but will eat newly born fry.

Aquarists should take careful stock of their fish and their eating habits, and ensure that the diet is adequate & balanced. Otherwise over a period of time, stress will develop, and with it disease that can affect all the fish in the tank.

Water changed often

Finally in nature the water is constantly changing, and only as said earlier if pollution occurs is their any problem on this account.

In aquariums this is a major variable. Most aquarists are aware they should change the water on a regular basis but for many reasons

(time, money, "theories" that contradict the popular wisdom, etc.) changes are made too infrequently or at too low a volume for any true benefit. Without doubt, this factor is responsible for many unexplained "sudden" outbreaks of disease, in tanks that had apparently had no problems. A good rule of thumb, in aquariums (fresh or marine) that are NOT overcrowded, is to change about 10-15% of the water volume weekly.