

Stress and Fish Health: Causes, Prevention, and Treatment

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Stress is present in the lives of all living things and is the force that brings about physical change and adjustment. Small amounts of stress can be harmless or even beneficial, but high levels of stress or prolonged periods of stress can create severe health problems. Many people are aware of stress in their own lives and can name many of the causes as well as possible treatments. However, the stress that affects fish is different and much more widespread. The nature of keeping aquatic species in confined environments generates many stresses that are unique to aquarium fish. To be successful in keeping healthy aquarium fish, you need to know what causes stress in fish as well as how to prevent it. Elevated stress levels are at the root of most health problems in fish and this article will help identify the causes of stress and give recommendations for treatment.

What is stress?

Stress is any condition that causes physical or mental discomfort that results in the release of stress-related hormones or results in specific physiological responses. For example, stressful events will cause an increase in heart rate, blood pressure, increased blood sugar, and the release of cortisol. Stress can be physical, psychological, or environmental. Stress can either be short and sudden, or long and chronic. Mild, short-term stress has few serious health effects, but long-term stress or severe, short-term stress contribute to many of the illnesses and deaths in aquarium fish.

The effect stress has on a fish's health

Short-term stress will cause an increase in heart rate, blood pressure, and respiration. The fish is reacting much as we do with the fight or flight mode. The fish can only maintain these altered states for a short period of time and then they will adapt or the stress will become chronic. Stress is accompanied by the release of the hormone cortisol, which is responsible for many of the negative health effects associated with stress. In addition to having a negative effect on growth, reproduction, and digestion, chronic stress will also lower the ability of the immune system to respond effectively and fully. This lowered immune response is what allows parasites, bacteria, and fungi to infect a stressed fish and cause disease and death.

The causes of stress

There are dozens of potential stresses to fish, but some of the more common causes are:

- Elevated ammonia
- Elevated nitrate
- Improper pH level
- Fluctuations in temperature
- Improper salinity
- Low oxygen levels
- Harassment from other fish
- Lack of hiding places
- Lack of enough fish to provide schooling
- Inadequate tank size
- Overstocking of tank
- Medications and water treatments
- Improper nutrition
- Disturbance of the tank
- Harvesting and shipping of fish

Elevated ammonia, nitrite, and nitrate all create deterioration in fish health due to stress. High levels can cause severe stress, whereas slightly elevated levels can contribute to chronic stress.

pH levels that change abruptly cause acute stress and continually elevated or lowered pH levels can cause chronic stress. Many fish adapt to long-term changes, but there are limits. pH changes of more than 1.5 points below or above recommended levels are going to have a negative effect over time and should never be considered acceptable.

Temperature fluctuations are a much underappreciated stressor of fish. Most tropical freshwater and marine fish do not tolerate temperature changes very well. Many tanks that are not set up properly will have over the recommended maximum of one degree of temperature fluctuation in a 24-hour period due to room temperature, lights, and equipment. The daily fluctuations will create chronic stress as will having too low or too high of a temperature in the tank for the species of fish present.

Wild fish live within very specific salinity levels (levels of salt in the water). Their bodies work hard to maintain the osmotic gradient between themselves and their environment. If their environmental salinity is not specific to their needs and is not held at a steady level, they have to work harder to maintain their osmotic gradient, which generates chronic stress.

Oxygen levels that are below recommended levels can cause fish to 'breathe' faster than optimum and this can result in chronic stress. Obviously, very low oxygen levels can lead to severe short-term stress and death.

Harassment from other fish and lack of hiding spaces go hand in hand. There should be two suitable hiding spaces for every fish in the tank, otherwise, there are going to be fish that are stressed and bullied. Remember that unlike their environment in

the wild, these fish are confined and cannot get away from aggressors. Aggression is a very real problem in many tanks that leads to many injuries, infections, and death.

Overstocking of the tank is a common problem that contributes to almost all of the stresses in the above list, from water pollution to oxygen depletion to harassment. Do not overstock your tanks. If you want to stress your fish, put too many in the tank and it will happen every time.

If you add something to the water to treat a disease or water condition, be aware that it can be stressful to your fish. Try to avoid treating the water if at all possible and always use a quarantine or treatment tank. Copper is an excellent treatment for saltwater ich or marine velvet disease, but it can be toxic and stressful to fish. Of course, using it is much better than letting a fish die from velvet, but it should never be used in a tank with healthy fish.

Improper nutrition is also a commonly overlooked stressor of fish. Many fish can live on minimal nutrition with old or stale flake foods, but this poor nutrition is a chronic stress. A variety of well-preserved dry foods as well as freeze-dried, fresh, and frozen foods specifically designed for individual species are necessary to prevent chronic nutritional stress.

Disturbing the tank through banging on the glass, constantly netting fish, or rearranging décor stresses fish and should be kept to the necessary minimum.

Probably the most significant stress for fish is bringing them from the wild or an aquaculture pond, through the wholesaler, and into your aquarium. When they arrive at your home, the fish will have experienced stresses including changes in their diet, and in the temperature, pH, ammonia levels, salinity, and condition of their water during the transportation and holding process. Remember that the fish that arrive at your tank are already stressed. This is why it is so important that your tank must be in an ideal condition and the acclimation process must be followed carefully, so as not to further stress the fish. The unfortunate truth is that the majority of fish mortalities occur at or near the time of entering a new tank and only through an appreciation of stress and its effect on fish can this problem be prevented.

How you eliminate stress

While it is impossible to eliminate all stress, we fortunately have the ability to limit or prevent many of the causes. Acute stress is more obvious and needs to be addressed very quickly. Chronic stress is often not visible. It can take weeks and months to develop. Your fish may appear to be doing fine, until one day one gets sick and dies, and then a few weeks later another one does and so on. If you have fish that are getting sick and dying, there is probably a source of stress on them that needs to be identified and remedied. The other big source of stress is bringing new fish into your aquarium. Buy only from the most reputable sources that move the fish in the most careful and humane manner. Acclimate your new fish properly, use a quarantine tank, and make sure your new fish are fed appropriately. Spend extra time on the new fish and be as careful as you can. Taking a little time here can make all the difference in breaking the chronic stress cycle and keeping these fish healthy and disease free.

Stress is one of the most critical factors in fish health. Only by understanding the effects that stress have on fish, as well as being able to identify and prevent common stresses, can we eliminate this problem. As aquarists, we need to be responsible for the health and welfare of all of our fish. Provide the highest quality water, nutrition, and suitable tank environment. Introduce new fish carefully and always use a quarantine or treatment tank when necessary. If we work hard to reduce the stress in our fish, we can virtually eliminate disease and health problems in our aquarium.