

## Introduction To The Nitrogen Cycle

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Understanding the Nitrogen Cycle is key to being a successful fish keeper. "New Tank Syndrome" is the major cause of premature fish death and can be avoided by proper attention to the Nitrogen Cycle.

The primary purpose of the nitrogen cycle is to handle biological waste in an aquarium. Fish, and other aquatic creatures, excrete waste in the form of ammonia. Ammonia is also produced by decomposing food, plant and animal matter. Ammonia is highly toxic to fish, even at low concentrations.

How do we handle all of this ammonia? Water changes are important, but we can never change water fast enough to keep up with the all of the ammonia being produced. Living plants will also absorb ammonia, but not nearly enough to eliminate it completely. The answer is bacteria. There are bacteria called nitrifiers which consume ammonia and excrete nitrite (note the spelling carefully). When you first start your tank, you will experience a spike in ammonia, until the nitrifiers build up enough to deal with your ammonia load. The ammonia levels will decrease to zero, but the nitrite levels will rise.

Nitrite is also poisonous to fish, but thankfully there is another type of bacteria, Nitrobacter or Nitrospira, that consume nitrite and excrete nitrate (notice the different spelling). Nitrate, finally, is safe for fish in low concentrations. Plants will consume nitrate as fertilizer, but it is still important to do regular water changes to remove excess nitrates and other biological buildup in the tank. While the Nitrobacter or Nitrospira build up, the nitrite will drop and nitrate will rise.

Colonizing the bacteria (nitrifiers, Nitrobacter and Nitrospira) is called "cycling" the tank. Once the colonies are sufficient to convert all of the available ammonia into nitrate, the tank is "cycled", or "established".

The spikes of ammonia and nitrite are hazardous to your fish, so before you add fish it is recommended you perform a fishless cycle. There is a step by step article on the OVAS site entitled "Step by Step Guide to Fishless Cycling".

Successful fishkeeping really has less to do with fish, and more to do with bacteria-keeping. Armed with this new knowledge, you should never have to lose a fish due to New Tank Syndrome!

