

# THE NATURE OF TOBI

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Anyone who breeds koi knows about tobi. In other species these are often called "shooters". They occur in goldfish spawns too. They are the fry that grow to juvenile size very quickly. They are noted for eating their smaller siblings. Most tobi koi do not have the refined characteristics the breeder is looking for, although some do.

I have never seen a good explanation of how and why tobi develop. If anyone knows of an authoritative description, please let us know. Until then, I will give you my off-the-wall theory about tobi. I think tobi are hard to explain because there are two factors at work, genetics and blind luck.

## Genetics:

Koi and goldfish carry in their genetic code remnants of everything that come before. A top-notch pair of gosanke or ranchu carries all the genetic material needed to make the ancestral common carp or crucian carp from which they were derived through selective breeding. They also have all the genetic material needed to recreate the incremental steps in their evolution. In the offspring from a pair of sanke you will find kohaku, higo and perhaps even a magoi. A group of ryukin offspring may include individuals with characteristics of wakin and common goldfish.

The more ancestral forms are always more hardy. Left to their own devices and allowed to breed indiscriminately for many generations, a population of koi will revert back to something resembling the ancestral common carp and goldfish will revert back to something resembling a crucian carp. In a group of sibling fry, those with a more primitive genetic make-up will be just a little bit stronger and faster giving them a slight advantage when it comes time to eat or avoid a predator.

But, in the world of fish fry, a slight advantage can become amplified many fold. There is a snowball effect. A fry that gets just a little bit bigger than its siblings is better able to capture and compete for food so it grows faster. The larger the size disparity, the bigger the advantage. So, over just a few weeks time an individual that is just slightly larger than its siblings becomes ten times larger than its siblings. At some point, the size disparity becomes so great that the larger individual can eat its siblings providing it with a new limitless food supply. The snow ball effect escalates.

## Blind Luck

But, how can some tobi be excellent examples of highly refined koi or goldfish and show no signs of being a throw-back to an ancestral form? I think it is because there is a blind luck factor at work as well.

Imagine a group of larvae which have absorbed their yolk sack and are ready to begin feeding. Perhaps some arrive at this stage a few hours ahead of the rest because they were spawned first or their position on the spawning substrate was a fraction of a

degree warmer than the rest, or because of some other factor. The larvae instinctively dart at a moving food particle. Some times they catch it and sometimes they miss. They are growing extremely rapidly and catching one or two extra choice food morsels can make a difference in that growth rate. Some individuals are just lucky and are able to get a tiny bit ahead of their siblings. As described above, a very small advantage can quickly snowball into a large advantage. An individual with no innate genetic advantage can become a tobi just through blind luck.

#### Another Observation

In some batches of fry the size distribution is large and there is an unusually large number of tobi. In other batches the size distribution is narrow and the siblings look almost identical. In general, the better the fry are fed the less variation there will be in their size. If abundant live food can be kept in front of the fry at all times while maintaining good water quality, there is a much lower incidence of tobi. Under the best of conditions the growth of fry is phenomenal and most of the population (except for those with serious deformities) has the potential to grow at the rate of tobi. The best way to minimize the number of tobi is to provide better nutrition and husbandry.

The biggest and best koi and goldfish will have had the best nutrition and water quality their entire lives. Periods of less than optimal conditions can have long-term effects. In extreme cases, we say that the fish is stunted. The younger the fish, the more severe and lasting the effect of poor nutrition and water quality.

Tobi are considered by most to be undesirables. If they are genetic throw-backs then they probably are undesirable. However, you should be on the look-out for those fish which have both the genetic potential to meet your selection criteria and the good luck to have gotten off to a fast start in life and become a tobi. It is always a good idea to separate tobi if you can; especially if they have become large enough to be cannibals. But, do not automatically assume they have no potential.