

Introduction to Angelfish Genetics

A Presentation for The
Angelfish Society

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If you are new to keeping angelfish...

- By now you will have noticed that angelfish come in an array of colors, with short, long, and even longer tails.
- My first angelfish were marble angelfish. I would watch my local pet stores to see what other varieties they brought in.
- Once I saw two adult angels in a pet store tank with a spawn of wigglers. The male was black and the female was gold. I wondered, what will the babies look like?
- Well, if you are at that early stage of confusion, this presentation will help it all make more sense!

Terminology

First, let's take a look at a few key words.

1. gene
 2. allele
 3. locus
 4. genotype
 5. phenotype
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Gene, Allele, Locus

- A **gene** is a short section of DNA on a chromosome that codes for a particular trait.
- An **allele** is an alternate form of the gene that causes the trait to be different in some way, such as another color.
- A **locus** is the location on the chromosome where a given gene is located. Since chromosomes come in pairs, there will be a pair of alleles at each locus, one inherited from each parent.

Genotype and Phenotype

- **Genotype** refers to the genetic makeup of an individual.
- **Phenotype** refers to how the individual appears. Phenotype is a combination of the effects of the genetic makeup and of environmental influences.

Wild Angelfish

- A wild angelfish is silver with black stripes. It has a short tail, referred to as a “standard” tail.
- All other varieties, such as gold, black, or smokey, are mutations that have been found in domestically raised angelfish, and then selectively bred for.



The angelfish in the foreground is a wild type. The one in the background is a color mutation called gold marble.

Let's look at the known gene mutations



Dark Locus



Black



Marble



Gold Marble



Gold

The dark locus has four non-wild alleles, producing these four distinct color varieties.

Zebra / Stripeless Locus



Zebra



Stripeless

There are two non-wild alleles at this locus. The Zebra allele adds an extra stripe. The Stripeless allele prevents the stripes from appearing.

Smokey



A single smokey allele will give the coloration known as smokey.



A double dose of the smokey allele will cover more of the body with dark pigment to give the coloration called "chocolate."

Veil



The veil gene cause the tail to grow longer. A double dose of this allele will give an even longer tail, called superveil.

This angelfish also exhibits the combtail trait, which results in elongated tail rays, giving a fringed appearance. The genetics of combtail have not been confirmed.

Half-Black



The half-black trait is recessive, so an angelfish needs a double dose to express halfblack. The front part of the body is striped, as with a wild type, but the back part is black.

Half-black is easily influenced by the environment. A fish that is genetically half-black might only develop partial coverage of the half-black coloration, or might not develop it at all.

Pearlscale



The pearlscale allele is recessive, so it requires a double dose to express the trait.

Pearlscale alters the shape of the scales, making them highly reflective. This gives the angelfish an almost metallic shiny appearance.

Pearlscale is influenced by the environment. An angelfish requires excellent environmental conditions to fully develop the trait.

Albino



The albino allele is recessive, so a double dose is required.

A double dose of albino prevents the formation of black pigments. Instead of black stripes, this angelfish has white stripes!

Streaked



The streaked allele causes a white stripe to appear through the dorsal and anal fins, and sometimes through the body. It can only be seen in darker colored fish.

Platinum

- Platinum appears to be a recessive trait that modifies a gold angelfish to be a striking iridescent white color. As the angelfish matures, it shows a lot of blue iridescence.
- The blue tends to show up in other varieties of angelfish that have a double dose of platinum.
- Platinum is currently under evaluation by the TAS standards committee.
- Sorry, no photo. All photos in this presentation come from photos that have been submitted for the photo contests over the years or have been otherwise donated for use by TAS members. We expect to add this variety to the phenotype library and the to the genetics calculator late this year.

Known Angelfish Gene Mutations

Summary of known angelfish gene mutations and symbol for each allele.

	LOCUS	ALLELES (symbol)
1	Dark	Black (D), Marble (M), Gold Marble (Gm), Gold (g)
2	Zebra/Stripeless	Zebra (Z), Stripeless (S)
3	Smokey	Smokey (Sm)
4	Veil	Veil (V)
5	Half-Black	Half-Black (h)
6	Pearl	Pearl (p)
7	Albino	Albino (a)
8	Streaked	Streaked (St)
9	Platinum*	Platinum (*still under evaluation)

More color varieties...

- Many more varieties of angelfish can be bred by combining multiple gene mutations into one angelfish.
- Sometimes a double dose of an allele acts differently than a single does.
- Sometimes a gene at one locus may influence the expression of a gene at another locus.

Where to learn more

- To learn more about how genes and their alleles interact to form the many varieties of angelfish, we suggest you visit these resources on the TAS website.
 - The phenotype library has discussion about the genetics for each variety:
 - http://www.theangelfishsociety.org/phenotype_library_2007/intro.html
 - Past presentations from TAS meetings – several presentations cover different angelfish genetics topics. Look on the presentations page:
 - <http://www.theangelfishsociety.org/PresentationsTAS.htm>

The End

Back to the chat room for questions,
answers and discussion!

