Genetics/Crosses by Tom Allen

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Simple Genetics

Guppies, like humans, have 23 chromosomes. Lined up on these 23 chromosomes are thousands of genes which determine traits that the fish will exhibit. During a mating, genes (*one from the male and one from the female in positional order*) combine to form the visible and invisible traits that the parents will pass to their offspring. Some traits take the combining of only 1 gene. Others, like the excellent red color in guppies we all work toward, take as many as 4 genes to complete. If your fish have only 1 or 2 or 3 of these needed red genes, you will never produce young which exhibit the super red color without crossing to another unrelated red strain.

There are two terms in genetic theory
that it would be appropriate to define at this point:
(1) ***phenotype***
which is the appearance of the fish and
(2) ***gneotype*** which is the genetics of the fish.

When entering your fish in an IFGA show (*or any other show for that matter*), it is the appearance of the fish that the judges are concerned about. If it is a "gold," it should look like a "gold." If it doesn't look (*phenotype*) gold, even though it comes from a gold strain (genotype), it is likely to be disqualified.

Here are some simple genetic illustrations:

GOLD is defined as a fish (male or female) that has at least 25% yellow gold color in the body (*like a gold wedding band*). The caudal can be any color. To obtain 100% genetic golds in a dropping, both male and female must carry the gold gene. It is positional and always appears in the same location on the same chromosome in guppies. That means that you can cross two different gold strains and be assured of always getting 100% gold babies in each dropping. Since there are so many other genes that play into making a quality fish, you may get gold but they may not be good golds. If you outcross a gold with a non-gold, 100% of the dropping will show the non-gold trait in the f-1 generation. However, all of the fish in the dropping will carry the gold gene (*its recessive*). Crossing brother x sister from this drop of young will produce an f-2 generation with (*on average*) 25% of the fish being gold in appearance and 75% will be non-gold. Two-thirds of these non-golds, are recessive gold but they all appear as non-gold.

BRONZE is a fish (*male or female*) that has an "old gold" background color in the body with, at least, 25% of scales with dark edges. Some grey strains have the scale edging but would be disqualified because they lack the background color.

You can substitute **BRONZE** into the **GOLD** write-up above and it will ring true. Bronze, like **GOLD**, can have any color(s) in the caudal.

ALBINO is any fish (*male or female*) that has red or pink eyes regardless of body color.

There are presently 2 IFGA classes for albinos:
(1) Red albinos and
(2) AOC (all other colors) albinos.

Like **GOLD** and **BRONZE**,
albinos follow an identical genetic pattern with the gene for albinism
being located in the same position on the same chromosome in every albino strain.
Thus, cross any two albino strains and you will always get albinos.
The genes for **GOLD**, **BRONZE** and **ALBINO,** while positional on the chromosomes,
are at different locations meaning that if you cross a **GOLD** and an **ALBINO**,
you should get 100% non-gold, non-albino young in the f-1 generation.

SNAKESKIN, by definition, is any male guppy that has an unbroken rosetta pattern covering at least 60% of the body. Females show no snakeskin pattern.
The gene for the snakeskin trait can be on the y-chromosome (*passed from father to sons*) or on the x-chromosome (*passed from mother to sons*). The only way to determine where the gene lies is to outcross to a non-snakeskin strain and check the f-1 males for the pattern.

HALF-BLACK is any male or female that has a black (any shade) coloration from the edge of the dorsal to the peduncle area with at least 50% coverage. The gene for half-black can be y-linked, x-linked or passed from both parents. The IFGA currently recognizes 7 caudal colors in male half-blacks (*red, blue, green, yellow, pastel, purple and aoc*) and 2 caudal colors in female half-blacks (*red and aoc*).

SWORDTAIL is defined as any male having a sword-like extension of the caudal.
There are single swordtails (*upper or lower*) and double swordtails.
Females show nothing that would hint that she is from a swordtail strain.
Both male and female must carry the swordtail gene to get swordtail young in a mating.

Crosses That Work

If you notice that your current strain is showing some weakness (*small size, poor color, bad finnage shape, no resistance to disease, etc.*) often to only way to introduce improvement is to outcross to a “compatible” strain. Recall that 85% plus of all outcrosses produce fry that are inferior to their parents. Because there are so many different guppy strains in the hobby, there are literally millions of options open to you but here are some crosses that have produced excellent hybrids in the f-1…

1) another strain of the same color.
   It makes sense that if you want reds, don’t introduce another color into the mix.
2) red albinos and reds
3) red and h/b red, blue and h/b blue, green and h/b green, etc.
4) purples and greens
5) h/b pastels and pastels (white aoc’s)
6) h/b pastel and blues (to produce h/b aoc’s)
7) solid color and yellow verigated snake females (to produce bicolors)

Note that not every possible cross like those listed above will produce quality young. Unless the parent strains are “compatible,” there is no telling what the f-1 generation will turn out to be. Likewise, there are probably other crosses that are not listed here that will work to produce excellent hybrid young.