

## Break in the Stipper Gene or What People Call Almond Expression

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A lot of people really like the tri color in the individual feathers in the almond phenotype. It is commonly called break. There are other genetic expressions that can cause break like toy stencil in special circumstances when not all three of the toy stencil genes are not all homozygous. I currently have a bird that is ash red and shows break in the wing shield. What I want to present here is my theory that break is caused by copy number variations or CNV. CNV is when there is a number of copies of a gene associated with certain gene. Stipper is one of those genes that has a CNV associated with it.

In all genetic expressions there is some kind of feedback control that regulates the expression of the gene. I am theorizing that multiple copies of gene cause problems with this feed back control. There has been studies<sup>1</sup> that show that a number of cancers are associated with CNV and lack of control of cell behavior. I think it is understandable that there are multiple genes involved with a trait can get over or under controlled by all of these genes producing a protein that skews the feedback to each of the genes involved. In production of the melanin in a feather in stipper it has been shown that melanin is reduced<sup>2</sup> producing white or lighter color expression. I propose that it also over produces melanin and then produces very intense black and a range in between the lack a melanin and intense melanin expression. I would like to have a lot more insight to why there is nearly always some almond colored feathers in the stipper expression even in spread. There really isn't any other mutation in pigeons that gives that reddish tan color of almond. I really wish I knew what the chemistry is going on in production of that almond color.



These are feathers from the saddle fantail wing shield in the photo to the left. This is very similar to stipper break. I really don't have any possible causes for this except if there is also CNV association with the expression of the color in this wing

The reddish color in this saddle fantail is dilute ash red. It really isn't very close to the almond color in stipper. Like in stipper the flecking can be quite intense even in dilute like in this bird. When I first saw a photo of this bird I asked the breeder that raised it if I would have it to test it to see if it was stipper. I have raised 7 young out of him and all the young have been ash red.

I have always wondered how there could be such intense black in stippers when it is thought in general as a lightening factor. I feel it may be a reasonable assumption that the intense black and white areas in stippers is caused by poor regulated expression of the gene.

1. Xin Shao, Ning Lv, Jie Liao, Rui Xue, Donghang Xu, Xiaohui Fan, Copy number variation is highly correlated with differential gene expression: a pan-cancer study

2. Rebecca Bruders, Hannah Van Hollebeke, Edward J. Osborne, Zev Kronenberg, Emily Maclary, Mark Yandell, Michael D. Shapiro, A copy number variant is associated with a spectrum of pigmentation patterns in the rock pigeon (*Columba livia*)