The Pigeon Genetics Newsletter, News, Views & Comments.

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(Founded by Dr. Willard .F. Hollander)
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Topics of this Month - **Print Grizzle** and its effect on other phenotypes., and Almond Kite.

Brander bronze , Brander and Print, & Print T-Pattern bred by **Emamul Islam Efti**

Also

Another opinion regarding Terminology in Pigeon Colours

Print Grizzle as we have discussed many times previously has been tested by Dr. Lester .P. Gibson about 25 years ago , and at that time he was of the opinion that it was a derivative of Classical Grizzle , Pied factor, and Tippler bronze generally found only in the Highflyer Breeds. --- I believe that it is a distinct mutation at the grizzle locus and therefore an allele of Tiger grizzle , and Classical Grizzle. There are many people out there breeding these birds who have direct access to everything they need to test breed and sort out the mutation. Most do not because they are much more interested in performance than the colour.

The heterozygous state with one blue bar parent looks somewhat like a hetero Classical Grizzle (G)., but lacks the white speckling of the head and neck, expressing a finer frosted appearance.

Bjaga   **Noor Namk Sy**

  

Classical (G) - Bob R. -- Print Grizzle - **Saurav Khulna** --- Dark Print - **Kabtar Baz Daud Khel**.

NOTE: These are all homozygous for their respective traits. The Classical "Storked" colouring has much less colour on the head , neck and in the flights than the Print Grizzles that often have very dark or heavily pigmented feathers on the head, neck and perhaps the breast as well as in the flights. This can vary greatly however as many grizzle highfliers are bred for performance not colour , and very close lines result in fixed expressions to the point of being Designs such as tail marked , or head neck and breast marked, or completely white.

There is a common tendency for Print Grizzles to have a dark throat marking and this was developed into a white bird with just a coloured throat referred to as a "chuck".

Light Print Grizzle ESFT bred & Owned by **Rob Grogan** , Australia.

A comparison of a Hetero Classical (G) bar and T-Check - and - Two barred Hetero Print Grizzles

Golam Rabby **Nadim Bappy** - Bangladesh

Below (1)Blue bar Print Grizzles with Pied factors as well as darkening modifiers . (2) Print as well as Saturated T-Pattern plus pied, and (3) Spread factor Print plus pied, and Light Print Pied.

Mahamud Hasan **Humayen Ahmed** **Reza Pigeon Loft**

Three Budapest High Flyers in Europe bred and Owned by **Istavan Nagy** demonstrating another fixed Design in a Print Grizzle phenotype. Note that the flights and / or tails may or may not express any of the base colour.

A group of whiteside youngsters bred by **Tom DeMunnik** that I think are actually Print Grizzles. Tom's work on these has him convinced that it is Classical Grizzle with recessive red whitesides in the pedigree.

Print Grizzles showing the range from pure white through Chuck marking to pseudo Tiger marked in saturated T-pattern. Photo - **Peer Ramzan**.

Undergrizzle , Pied factor , and smoky are commonly found in Print Grizzles.

 "Chuck" marking Print Grizzle , bred and Owned by **Choudhry Zaheer** .

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Hi Bob,

Thanks, as always, for the monthly News Letter.
Well, the topic "Terms we like to use in our Pigeon Fancy !" is a good choice.
Many terms are used for ages and indeed born out of ignorance but also, even more so, out of the lack of knowledge of the actual pigmentation.
The term "Dilution" is a good example of the latter. You and I have discussed this before. Why the term "dilution" was used when it was first described is understandable as the mutation appears to dilute the colour; red becomes yellow, and black becomes 'dun' (liver coloured, with a brownish hue). However, if you think about it, it is not dilution is it; it is a totally different colour all together. If one dilutes red paint, for example, it will be mixed with white and becomes pink. A red t-shirt washed too often becomes pink, and not yellow. And a black t-shirt gets grey, and not liver coloured.

From a scientific point of view dilution in pigeons is a form of albinism. In general, the different melanin mutations can be divided into four major categories:
1. Defects in the development of melanin cells (White Spotting)
2 Defects in the melanin synthesis (Albinism)
3. Defects in the melanin deposit into the feathers (Dilution)
4. Defects in the type of melanin produced (Melanism).
See also: What's in a name? Nomenclature for colour aberrations in birds reviewed (bioone.org)

The enzyme tyrosinase, naturally present in the melanin cells, catalyses the melanin synthesis, but due to inheritable causes (mutations) it can become absent or less active, with no or an incomplete melanin synthesis as a result. Although the normally black melanin granules can range from light cream/beige-coloured to dark brown when the synthesis is incomplete, in medical science any mutation affecting the
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normal melanin synthesis is defined as 'albinism'. There is, however, only one true albino, all the other mutations can be categorised as forms of albinism but they are not albino.
Mutations within Albinism known in the pigeons are Albino, obviously, but also Brown, Pale, Dilution and Extreme Dilution. Due to the incomplete synthesis the melanin does not reach its maximum colour; black for eumelanin and deep red-brown for phaeomelanin. Instead it stays light beige coloured to dark brown (eumelanin) or pale yellowish brown to deep golden-brown (phaeomelanin).

In the mutation Brown the incomplete melanin synthesis causing the eumelanin to remain dark brown instead of becoming black. In Brown the squabs have reddish eyes. Dilution and its alleles all have different effects on the final melanin pigmentation; in some hardly any melanin is produced resulting in nearly-white plumage (Extreme Dilute), while in others the plumage is only slightly paler than the normal colour (Pale). What they all appear to have in common is that at least some of the melanin present is incompletely oxidised and therefore (much) paler than normal. Also, in all these pale forms, the colour of the eyes and skin is to some degree also affected. So, the mutation Dilution and its alleles in the pigeon affects the melanin synthesis and therefore is a form of Albinism. Although I don't hold my breath regarding a change of the term "Dilution" in our fancy, but technically it is incorrect. Mutations in the pigeon which are Dilution (3. Defects in the melanin deposit into the feathers) are, for example, Ice and Milky, and both forms of Opal.

And, while, speaking of "terms we like to use". Whether you call it "design", or "pattern", the examples you gave of the arrangement of coloured and white feathers are all different forms of Leucism (1. Defects in the development of melanin cells (White Spotting)). Leucism, from the Greek *leukos* (for white) causes the absence of melanin in the plumage as a result of the congenital and heritable absence of melanin cells from some or all of the skin areas where they would normally provide the growing feather with colour. The extent of white feathering can vary, from just a few white feathers (partially leucistic; e.g. white flights) to the plumage being completely white (recessive white).

The white pattern (or "design") in partially leucistic birds is often patchy and bilaterally symmetrical due to the way the melanoblasts migrated in the early embryonic stage to the rest of the body, leaving certain areas without melanin cells. The pattern can be caused by a delay in the migration of the melanoblasts from the neural crest—the embryonic spinal cord— to the skin. Normally, melanoblasts migrate at an early embryonic stage to the mesodermal layers of the skin. Finally incorporated in the skin and feather follicles, melanoblasts develop into melanin cells to provide the feather cells with melanin. Because of the delay, some melanoblasts reach certain parts of the body where the skin is too far developed to incorporate them, resulting in these parts lacking colour. Another possibility is that, from the outset, insufficient melanoblasts develop in the neural crest and therefore not all parts of the body are provided with melanin cells. Whatever the cause is, the white pattern in Leucism is static meaning it occurs already in juvenile plumage and the amount and pattern of white feathering does not change with age. White feathers due to Tiger Grizzle, or White Shield are NOT due to Leucism.
Some of the patterns of white feathers, e.g. saddles (all white but with only coloured wing shields), are a combination of different leucism mutations together to achieve the final "design" of white feathers . Personally I think "design" is not a very clear term to use for this. The term "pattern" is already used for the different wing markings, but "Pied Pattern" might be a good term to distinguish the different Leucism mutations from other "patterns".

Cheers. Hein

Editors note : Perhaps YOU have another spin on this topic and would like to share your opinion. Simply send me an email Bob_rodgers556@hotmail.com and I will include it in a future Issue.

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Recently on another Facebook Group that I was asked to join, there have been many rather heated discussions about the ALMOND colouration and the genetics involved especially in regard to the components that are recommended to create and maintain the Classical Almond phenotype. I know we have covered this topic many times here in the Newsletter , but I had a few thoughts that I felt some of you would find interesting.

Classical Almond is a man-made phenotype whereby a very specific attempt is made to control the effects of the stipple gene on blue/Black base . The Pattern used is the most Saturated known to the Hobby without being Spread factor. Breeders through the years have decided that spread factor should be avoided because it masked the bronze and they saw that as detrimental in their attempts to produce a good BRONZE / Almond ground colour.

The Stipple gene de-pigments the base colour blue Black to basically cause a white pigeon, but some blue or Black remains intact to produce flecks throughout. Birds of this phenotype with or without Spread are called SPRENKLES or SPRINKLES .

The Almond phenotype is created by ADDING colour genes that **resist or stifle** the whitening effect of Stipple. These are referred to as COMPONENTS ( Dr. Hollander). The components are : Saturated T-Pattern (C^T) blue/Black, Kite Bronze (K)., and recessive red (e). The (e) may be in the form of Solid recessive reds OR white mottled wing reds called AGATES.

Here is where I strongly believe that the improper use of terms has led to a great deal of unnecessary confusion over the many years as the 'Solid' coloured birds became known as whole colour Agates. When I asked a number of times for anyone to show that they could produce a mottle from two solid reds or a solid from two mottles, the subject was quickly dropped and a new topic presented. Obviously the tests I suggested would not produce the results suggested and the reason is because the Solid reds ARE NOT Agates. They lack the gene or genes / conditions that will cause a mottle wing. The gene is suspected to be an "ENABLER" and is considered a dominant thus it was given the symbol (En).

The other aspect of these components is that there is absolutely nothing known about the genome of the so called "KITE" . It is the Saturated T-Pattern blue/Black that has the addition of Kite bronze. These birds are usually always a high sheen solid black including underbody and tail. They by all appearances look spread factor , but they are not, at least not the one we refer to by the symbol (S). Spread factor causes the concentrated pigment cells seen in the sub-terminal tail band to be in effect spread all over the entire bird masking pattern. Kite and for that matter all bronze traits do not express in the sub-terminal tail band and therefore may not be part of the pigment cells of smooth spread. Here is where it gets very complicated. Kite bronze pigment cells appear not to be part and parcel of the base smooth spread factor cells and have to be added. They are not carried over the entire bird with spread factor unless added. That makes sense because when the stipple gene de-pigments the blue/Black, only white
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break is left. However when the Component Kite is added , those white areas look tan colour. That tan colour can be enhanced to a rich Almond tone by adding the component recessive red (one dose), and the modifier Dirty (V) two doses. However there is still something missing. The Saturated T-Pattern black with Kite bronze has additional sheen but may also have yet another trait that causes the blackening of all feathers. That key feature seems to come from very early times perhaps in India via the Gimpel Archangel. No one knows for sure.

Something I found interesting is that if you take any Saturated T-Pattern bird and add the mutation "INDIGO" , you get that T-Pattern blue/black , but the shields will be deep bronze. However if you combine the Saturated T-Pattern (Kite) of Almond breeding with Indigo , guess what you produce?? It will be an 'ANDALUSIAN'! That is correct , the same result as when you combine Indigo with spread factor blue/Black and NOT a bronze wing Saturated T-Pattern !!

Here is a saturated T-Pattern blue/Black Indigo : **Jerry Sindelar** and 4 patterns Indigo **Layne Gardner**.






From the above two photos we can see how recessive red can make a considerable difference in the tone of phaeomelan of the black wing shield of the Saturated T-Pattern blue/Black. We also can see the red in the flights and the red cast on the head not unlike what we see in the pseudo black Saturated T-Pattern (Kite) of the Classical Almond breeding programs. If we were to add Spread to any of these , we would get solid Blacks and Andalusians.

Recessive red causes a deep firey red and that is where Jerry is headed with his pouters.

Above two photos : Indigo saturated T-Pattern blue /Black **Layne Gardner** --------Indigo hetero (e) sat. T-Pat. **Jerry Sindelar**.

Here is a Roller bred by **Stephen Scott** that he said is a double Indigo Saturated T-Pattern blue /Black. It looks like it is a recessive red Indigo, it is an old photo and I may have gotten the captions mixed up . Photo (2) is a Brander Bronze by **Octavian Sarofolean** that he says is also Grizzle despite no expression.

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I know there is at least one Breeder who is working on creating a saturated T-Pattern pseudo black and he sent a photo to me of a young bird , but I was unable to locate it for this issue . Perhaps I can have that another time.

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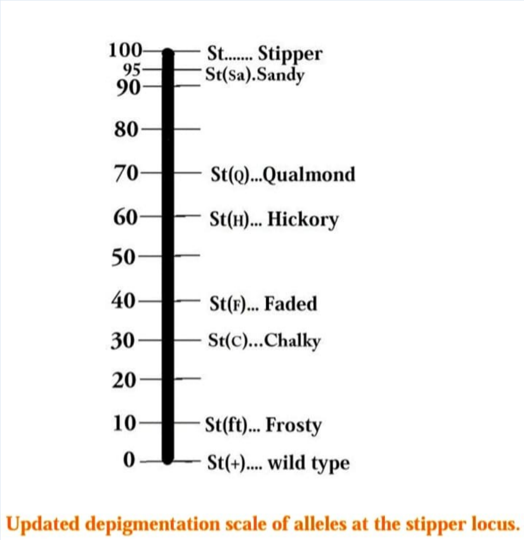
Back in 2020 I produced a PDF dealing with the Stipple gene and a great deal of what is known about it as a "First Installment ". I hope to follow with a second PDF soon , so I have added this previous Issue here with slight adjustments from the original, for your consideration.

Study of the Stipple Locus

Summary of discussions on Break.

The Stipple gene mutations at the Stipple (St) Locus create a large family of alleles that each , in and of themselves, have many phenotypes due to the shear variability of these rather unpredictable traits in Pigeons.

By Bob Rodgers , founding Member of the St-Almond Stipper Group , Facebook. 7/7/2020.



Updated depigmentation scale of alleles at the stipper locus.

A general placement chart by Jith Peter plus collaboration with **Tim Kvidera** as an update to that of **Doc. Hollander's** original. This chart will likely continue to be changed in the years to come - photo: (Pair of Classical Almonds bred by **Link Martin** breeder.)

Locus : A location on a Chromosome where mutations can occur.

Stipple: the gene mutation at the Stipple locus.

(St) : Danish symbol for Stipple .

Stipper: any pigeon that expresses one of the above (St) Mutations.

Sprinkle / Sprenkle : The (St) gene plus Spread factor or Pattern series in any of the three base colour Pigments but preferably lacking any bronze traits and no heterozygous recessive red (e).

Almond : The (St) gene plus any Pattern series bird that also expresses at least heterozygous Kite bronze, and may also express the influence of hetero recessive red.

Classical Almond : The (St.) gene plus homozygous saturated T-Pattern blue / Black series, homozygous Kite bronze, heterozygous recessive red, lacking spread factor. { St//+, C^T//C^T, K//K., e//+ }

Deroy : A Stipper recessive red.

Multi - color Almond : The Stipple gene plus any pattern, and Kite, These may express hetero or homo T-pattern or any other pattern , they may be hetero or homo Kite , may or may not be hetero (e)., and may or may not be expressing any one or more of the vast array of modifiers such as smoky, Sooty, Dirty, dilution and its alleles, etc.

Sub-Varieties : The actual sub-varieties are the other (St) mutations at the stipple locus - as shown in the chart above.. You may have seen us call the trait components as Sub-Varieties in a past Issue in error.

<u>Components</u> : These are as James Mullan stated ; the "building blocks" of the Classical Almond. We have incorrectly named them <u>sub-varieties</u> in the past. They actually are : Saturated T-pattern, Kite bronze, Recessive red (Agate), and Deroy (St.- recessive red OR recessive red Almond).

Now let's take a look at what each of the above actually does.

(1) **(St)** - causes a variable white break in Base pigment by de-pigmenting colour granules.

(2) **(C^T)** - supplies a saturated dark pattern without spread factor.

(3) **Modifiers of (C^T)** - while thought to be Dirty(V), smoky (sy) , and Sooty (So)., these alone added to a regular T-pattern C^Dk) bird do not give the desired saturated specimen with black underbody and tail that is typically used in Classical Almond breeding. That exact genome remains a mystery.

(4) **Kite (K)** - this is a type of bronze that should be homozygous in the Classical Breeding specimens and it is found in all components : (St)., (C^T)., and (Agates) . The bronzes are still not fully understood. A common mistake is to consider ONLY the T-pattern as a "KITE" , when in fact kite is a bronze trait that can be placed in any base colour and pattern.

(5) **recessive red (e)** - this trait supports the Kite phaeomelanin (red pigment) to assist in resisting the breaking action of (St). It causes a richer tone of Almond. Stipple has little or no affect on homozygous bronze.

(6) **Agate** - traditionally an agate was named for its marbling effect when combined with recessive red. Again its source is a mystery. Some believe that it is a type of grizzle gene , while others support the idea that it is an "enabler" gene that requires homo recessive red in order to express. The expression is whole white feathers usually in the shield area but also possible on the back of the head and neck and scattered elsewhere. The birds are feathered out in the nest as solid red and grow in whole white feathers with the first moult. To my knowledge , NO tests have been conducted to date, to discover what the "enabler" gene actually is , or how it is carried . Some believe that it may be the same gene that causes a recessive red white side phenotype.

(7) **Whole Agate** : Based upon the ratio outcome of Punnett square calculations , two expressions of recessive red are possible from the Classical Almond plus its breeding program components. One is Solid red, (whole Agate) that does not moult out to a mottle wing, while the other is solid red in the nest and moults in white feathers particularly in the shield area with the first moult (true Agate). Why these two are both considered to be AGATES is difficult to understand, especially since no one appears to have ever mated two of the Solid reds together to see if the hidden enabler comes out in a percentage of the young . Likewise, while two "Agates" have been mated , it is not clear if that was two mottled , two solids ., or one of each. The progeny are said to all be AGATES , but again it is not clear if they were all one type or some of each of the two named as agates. Punnet squares give only that which is entered.

Near Classical Almond phenotypes are being produced in other breeds that do not have a comparable Agate mottle wing phenotype component. The reds are often solid in the nest with an 'undergrizzle-like' tail colouration that is referred to as 'sugar tail'.

APPLICATION

The (St) gene must be present in order for its influence to be visible. Its effect is to de-pigment base colour granules so that areas of a white break in colour occur. It is still not clear if this de-pigmentation is an outright stoppage of the development of pigment cells , or just the inhibition of melanin within the cells. It is essential to understand that this Break is colourless and caused by the breaking action of the Stipple gene. Why? Because breeders cannot possibly apply any of the components properly to control the desired phenotypes if they do not realize and accept the fact that Break is only the white areas that they need to contend with by manipulating the use of the components.

If we consider a solid black pigeon :

photo **Mick Basset** - Leipzig

Then add the Stipple gene :

Photo **Quido Valent** breeder

This is still a uni-coloured bird of Black base pigment but with Stipple white breaks evenly dispersed throughout the entire bird ideally in a 50/50 ratio. (This analysis based upon the fact that white is not a colour but rather the absence of colour).

This was the phenotype that led very early breeders to coin the term "Ermine" .You can immediately see the relationship with white pelts of the Weasel with its black tail tip, that had been sewn together to make an Ermine coat.

Now let's apply the (St) to the pattern series (blue/Black). Here again we will have basically one base colour plus white stipple break but due to the distribution of the base pigment colour in various ways which makes the 'patterns' , some of the coloured areas of feathers will appear blue/gray, and others black such as the bars or checks.

Photo (1)old collection by Jith Peter from a **breeder in India**. (2) bred by **Octavian Sarofolean**.

If we add other modifiers to sprinkles such as hetero recessive red and perhaps hetero Kite , the bronze (reddish phaomelanin) will begin to express on the neck area. Below, possibly a sprinkle spread factor OR T-pattern blue/black with bronze and/or (e) expressing on only the neck feathers -

Marlo Reishus .

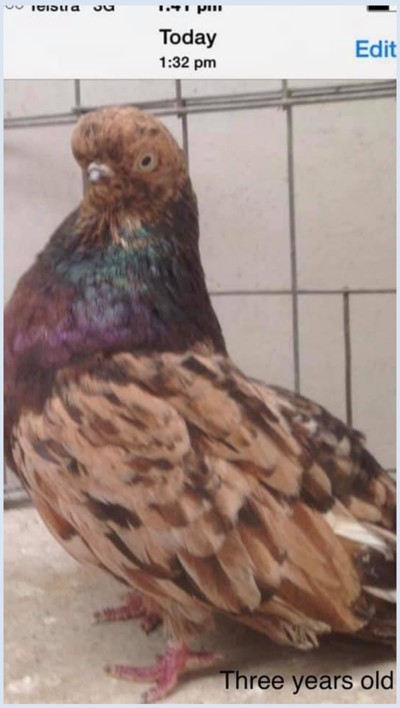
And then add hetero Kite - Here is where we begin to see the so-called 'Almond' expression. Bronze alone will cause a tan-like shade of colour wherever white break normally occurs. This effect creates what some refer to as the 'ground' colour of the typical Almond. Here on a T-pattern blue base it barely expresses, Baldhead and white flight Pied factors also lighten other expressions.

Bob R.

It can be enhanced in its tone to appear about the same colour as the inside of an Almond nut shell. The recessive red gene in the heterozygous state is used to enhance the resistance to stipple break . White Break then appears only in the flights and tail feathers where kite does not express on smooth spread. The body white break is filled in with bronze (Almond) colour .

Joe Power photo /Breeder.

The Ideal Classical Almond has a very specific genome that must be carefully selected so as to ensure that the outcome will be not only Ideally suited for the Show room , but be consistently produced to avoid ending up with a large number of indefinable phenotypes that may be Stipper , and may be Almond , but are not Classical Almonds. Another key point is that you do not want your birds to season too early in life. Many specimens have undergone an almost complete reversion to T-pattern kite by age 5 years old. Below is a gorgeous Classical Almond Cock that at age 3 yrs. is a perfect nut shell colour and by the ripe age of 10 yrs. is still the tone of a roasted Almond . This is what it means to BREED CLASSICAL ALMONDS !



Rob Grogan Breeder.

Another point I think should be made is that the Pattern is indeed saturated so that we cannot see any outlines of checking etc.

The Components = hetero Stipper gene (St//+) , homozygous Saturaded T-Pattern (C^T //C^T) , homo Kite bronze (K//K) , hetero recessive red   (e//+) (red agate lacking spread).

Below demonstrates exactly how the white stipple break is able to express predominantly in smooth spread areas where it has least resistance from the base pigment and the addition of Kite bronze and even possibly the addition of hetero recessive red. (this fact first pointed out by Bob R.)



Scott Sharp. Rob Grogan.

Ideal tail colouring with stipple white break in the tail band. This area of the tail is obviously where we find the concentration of Smooth Spread pigment granules , and bronze never expresses in this area thus there is nothing here to resist or replace stipple break/de-pigmentation. The same can be found in the flight feathers toward the ends. One may question why is it not then much more exact?

The key issue is the repeated error made by a couple of people that Break is flecks ., and Flecks are Break. Therein lies the root of the problem. **Break is not expressed in flecks**. It is the **areas of white** caused by the very action of de-pigmentation by the stipple gene.   Flecks are the areas of concentrated base pigment that have resisted de-pigmentation, possibly due to them being more concentrated and/or by the influence of other darkening modifiers.. The white areas will close in again during reversion as the bird ages and the stipple effect weakens. The bird does not become more 'broken' in phenotype , in fact it becomes more whole, or complete in Base pigment expression. To say that this is a notion of mine and not scientific, further accents the lack of understanding by a few of how the stipple gene functions. It has extra copies of the factor that constitutes the variable reaction giving us a totally white bird if it were not for the strength of the Base pigment to resist with support from saturated T-pattern, enhanced by other modifiers some of which we may possibly not even know about to date, as I mentioned earlier in this summary.


Blue tail feathers showing a blacker inner vane That I believe is a key factor (possibly the addition of coarse spread) where bronze is able to express.

The other mutations at this locus must be considered in two groups . Those very similar to Stipper Almond , and those that are very different in phenotype. However they are not listed quite in that order on the de-pigmentation chart. That is because they are being segregated based upon the amount of whitening each has in the homozygous state.

White Out is the newest mutation and it renders specimens almost pure white , there may be a few colour flecks in the neck area. Semi-lethality is associated in some homozygous specimens.

St. Almond is almost totally white in the homozygous state and also semi-lethality is associated in some of the 25% homo male offspring .

Sandy - little is known and true genetic specimens may not even exist now.

Qualmond - Usually very gray in tone with very scant flecking depending on pattern (C) or presence of spread(S)

Hickory - Closely resembling Almonds but with the tail still showing almost normal band and colour.

Faded - Hetero males and hemi females appear similar , homo males quite different , no flecking in any.

Chalky - resembling milky factor with a rather mealy-like expression.

Frosty - homo males resembling smoky and hetero classical Grizzle , hemi females alike wild -type blue.

Stipper Tailed - A trait discovered by Dr. Lester .P. Gibson whereby the birds appeared normal with only the stipper effect in the tail. May not exist today.

The consensus of the talks ongoing in the St-Almond Stipper Facebook Group thus far is at a stalemate regarding "BREAK" as a term within the Stipper Almond Discussion. Some members feel Break is the residual base pigment flecks.

I have asserted the idea that both that idea and the centuries old application of the term Break (to mean the overall admixture of all of the tones of colour), are both incorrect and detrimental to understanding the true action of the Stipple gene . I feel that some of the comments in the Group bear that out. The above summary of what takes place when Stipple is added to a non-stipple bird , I think , clearly demonstrates that the whitening / de-pigmentation action of the Stipple gene IS the BREAK! The break in or from the Normal Base Pigment.

You the Breeders must carefully examine both sides and see which works best for you. I think the term is here to stay , it just needs to be clarified and understood by YOU the Breeders.

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