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The Pigeon Genetics Newsletter

News, Views, and Comments.

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~ DePiGmentation ~

Where , when , & why ., do we get Mutations that cause a breakdown in the amount of Pigment that is expressed in the Skin ., Feathers , beaks and Toenails of Pigeons ?

There are many answers as we take a closer look at the various Traits that have Mutated to bring about changes from "Wild Type " to new expressions that may be close to pure white. ..... Pieds and pure whites will be a separate topic for the New Year.

Pigments are colored substances that can be found in both plants and animals. The coloration created by pigments is independent of the structure of the feather. Pigment colorization in birds comes from three different groups: carotenoids, melanins, and porphyrines.

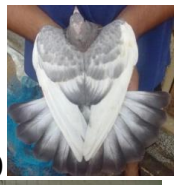
Neural crest cells are a temporary group of cells unique to vertebrates that arise from the embryonic ectoderm cell layer, and in turn give rise to a diverse cell lineage—including melanocytes, It is from the Melanocytes that the Melanin is produced that gives us the granules of pigment found distributed in the various forms throughout the feathers of Pigeons . Granules may be very fine ., or large by comparison. They may be sparsely or densely distributed . They may be of various shapes , and may accumulate at the core network of the feathers rather than evenly distributed throughout the feather.

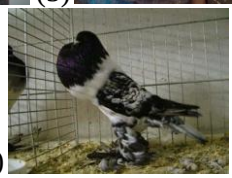
The colors in the feathers of a bird are formed in two different ways, from either pigments or from light refraction caused by the structure of the feather. In some cases feather colors are the result of a combination of pigment and structural colors.

Colors produced by the structure of the feather. Instead of pigments, are produced when light is refracted by the proteins in the feather.

Let's list the partially de-pigmenting traits first :

(1) The Classical Grizzle Family heterozygous (G) Bob R., **(2) Homozygous (G) Photo** Mick Bassett., **(3)The Stipper/Almond Family (St),** photo Bassett., **(4)Flash grizzle** photo Levi ., **(5) Under grizzle (Ug)** Jith Peter., **(6)Indigo factor (In) Andalusian** Vivki Colpits ., **(7)The Opal Family (Od)** Bob R.., **and the Stencil Families (8) (Ts)** Bassett photo , **& (9)(fs)** Anwarul Kabir's FB friend., **(10) The pencil Factor** Jim Richards.

(1)  (2)  (3)  (4)  (5)  (6)

 (7)  (8)  (9)  (10)  .

Each of these has a visual effect on at least one specific region of the bird and may affect certain regions of each feather in the process. Genetically the bird is entirely affected in each case , but the effects may only be visually notable as scattered segments of de-pigmentation. In some cases the de-pigmented areas appear to squeeze the available pigment into condensed flecks or patches such as we see in Stipper /Almonds ..

In Classical Grizzle (G), we refer to this effect as "Salt & Pepper". In the Stipper /Almond trait we refer to the de-pigmentation as "Break". These two traits affect the appearance of portions of just about every feather on the bird albeit very slightly in some cases .

Modifiers again play a role in either facilitating or inhibiting the deletion effects of these genes.

The base Wild type Blue series and its two mutations Ash and brown will each be affected in the same way by these genes ., but phenotypically, (how they look), will not only vary due to the differences in base colour , but also due to the way those base colours lend themselves to the effects of the de-pigmentation process. For example , ash tends to diminish pigment to begin with , so any added deletion creates an even lighter result.

We touched on the topic of "qualitative reduction " of melanin in the last Issue . In such cases there is no actual de-pigmentation , instead the overall tone is somewhat lessoned . Modifiers that cause this are : beginning with #2., (1)Intensity , (2)dilution (d)and Pale(pa) . (3) Ecru Tim Kvidera , (4)Reduced (r) Steve Scott, (5) Saffron (Saf) Jith Peter , (From #2 onward, are diminished tones , you can see that they lack intensity but there is no actual whitening unless pied factor happened to be also present.)

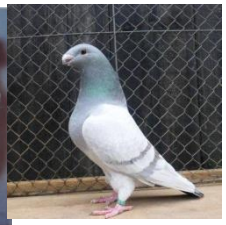
(1)  (2)  (3)  (4)  (5) 

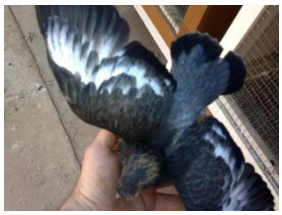
There are Modifiers that <u>add</u> pigment concentration : Dirty (V) , smoky (sy) , Sooty (So), and The Bronze family , These modifiers can be applied along with any of the aforementioned genes or combination of genes.

(It must be noted here that - While usually , eye colour is determined in the "optic cup" not the "neural crest " where the other Colour Modifiers originate , some genes may be affected in both areas .) Associations between specific Base pigments and eye colours are still under review .

Skin , Beak , toenail , and feather colour may be further de-pigmented in the case where the genetic trait is homozygous (pure) coming from BOTH parents . Partial de-pigmentation only, takes place in the heterozygous and hemizygous state , whereby only one parent contributed the gene to cause impure males or pure females for a given trait.

Let's take a look at a few combinations of certain traits :
(1) Milky dilute Levi photo, (2) Indigo dilute Manuel Alvemaz , (3) reduced Spread blue Steve Scott., (4) reduced recessive red Jijo Thomas.,(5) Stipper Spread blue Photo Wim Helsema., (6) Pure Ts complex +pure (fs) +spread blue + dirty (V) +Sooty (So) Australian Assoc.facebook Group .(7) T-pattern Blue kite bronze Undergrizzle Prasad Pamadath. (8) Dirty (v)+smoky(sy)+T-Pattern (C^T)+Undergrizzle (Ug) Barry McPhee. (9) milky Blue +Frill Stencil + Ts + Spread + T-Pattern + Kite Anee Sheikh .

(1)   (3)  (4) 

(5)  (6)  (7)  (8)  (9) 

Undergrizzle : I mentioned earlier that Undergrizzle is not part of the "grizzle" family. It seems to be a genetic Mutation entirely different unto itself. It affects as I said earlier , the entire bird but undergoes reversion to the Base colour leaving only the basal regions of feathers affected. These regions are most obvious in the larger feathers such as the primary flight feathers , the secondary flight feathers and the Tail feathers. There may also be residual grizzling on the feathers of the underbody. Here are some photos that were presented by Kamal El Motaouakkel on "Strictly Genetics " Facebook Group . The birds belong to his friend.

Why does Pigment get "SHUT OFF" in mutations ?

Not every mutation cuts off pigmentation production , but those that do , would either directly or indirectly play an important role in Pigment production . Melanin is synthesized in a multistep biochemical pathway. Sometimes a mutation in a gene that codes for a protein which has an important role in the biochemical pathway can directly affect the pigmentation production which can result in an alteration of the pigmentation , sometimes a complete shutting off will take place, whereas some genes indirectly affect pigmentation , such as genes which code for "activator" proteins. Variation in such genes can also affect the production of Pigment distribution and the impact may vary depending on the mutation.

What takes place to allow it to be turned back on ?

This becomes rather complicated in giving a simple answer , but generally it is a "reverse mutation" , thus the term "reversion" to wild type. We can expand this topic to more than Pigeon Genetics . During the evolution process, the function of a gene can be replaced by another or sometimes the function of a gene can change from one to another , usually resulting in a breakdown of the initial mutation to bring about a reversion to the original trait .

The areas affected by the various depigmenting genes are :

The **classic Grizzle** is affected over the entire phenotype , but to a lesser degree in the Flights and Tail.

The **Tiger grizzle** also affects the entire bird , but never partial feather expression and with no affect to flights & Tail.

Flash grizzle affects mainly the tail and sometimes the inner edges of the Bar region.

Undergrizzle is not actually a grizzle , its affect is seen over the entire bird in the juvenile (Hetero . & Homozygous) but undergoes reversion with age to just Tail feathers , and basal primary and secondary feathers , and in some cases the feathers of the underbody. It is usually accompanied by Kite bronze in the primary flights .

Almonds may be partially affected throughout all individual feathers in the hetero. Pure males may be nearly pure white if they live . Heterozygotes undergo reversion with age . Residual bronze, usually present, resists the breaking effect of (St) thus the tan (almond) colour for which such patterned birds are named.. Spread birds are typically Stipper marked.

Toy Stencils have only the COARSE SPREAD pigment of the wing patterns (C) affected in various tones from rich bronze to white depending upon the complex configuration.

Frill Stencil affects only the SMOOTH SPREAD areas of the wing tips and tail band. It may also affect all feathers influenced by additional darkeners such as Sooty ., plus Dirty and /or smoky.

The **Dominant Opal** (Od) factor affects the entire bird by slightly lightening it but has its main affect variously on both the Smooth and coarse spread areas by a bleaching, which may show bronze if it is present , otherwise a white replaces the base colour .

Recessive Opal (o) affects the entire bird , but mainly the Coarse spread areas and all feathers basally.

The **Indigo factor** also bleaches the tail band and flights but tends to darken the entire bird , in particular the head region. It will also allow us to see a residual bronze cast over coarse spread areas and possibly the neck area .

Anthracite is similar to the undergrizzle expression as it also affects the flight and tail feathers .

Lal - Band Ghagra **gray flight ,** The trait similar to under grizzle which is present in Lalband is not Saffron (Saf), but another flight base whitening mutation that we have not disclosed yet to the public!

Pencilled factor whitens all feathers basally with the affects most noticeable on the larger feathers leaving only the outer edges coloured with a few scattered patches of darker feathers.

See photo examples below :

"Showcase of Depigmented phenotypes and their Genetic Make-up"

Spread Blue Heterozygous Tiger grizzles - Qafi Lofts .

Homo Tiger Pied Himanshu Katyal. &Timisora grizzle (Tiger allele) Photo Suathaline Incedag.

Light ,medium, dark , and Saturated T-Pat.Tiger grizzle Brander Bronze Tortoiseshells. ~ Mick Bassett photo.

Typical Classical Grizzle Hetero Ana Martins NPA. & Homozygous, (Storked) - Marlo Reishus.

Gulf Farm photo Hetero & Homo Classical Grizzle .

Gulf Farm Homo Classical Grizzle ..

Typical Light Print Grizzle (Classical Grizzle + Undergrizzle + Pied factor (s). (Christain Padella)

Pair of Heterozygous Print Grizzles Blue series - Photo - Ebic Sisi Arabic.

Lavender Print Grizzles - Haji Ahmand. & Pair of Homozygous Print Grizzles Blue series, Hassan Askari

Pair of Blue series Undergrizzle Brander bronze. Dihantha Reiad photo.

Full Complex Toy Stencil Lahore T-Pattern Blue series . Photo Jerry Sindelar , and a pair of Satinettes Spread blue and T-Pattern blue series with both full Toy Stencil Complex (TS) and frill stencil (fs) showing the different effect of (fs) on the tails . Shoibal Sabbir owner .

Pencilled - Kurt Gossens .

Pair of Classical Almonds - Jijo Thomas U.S.A.

Spread blue Stipper ~ Dano Kane

Classic Grizzle Blue Barless - Wayne Murphy .

Frosty Andreas Lieb & Robert Mangle

Faded Blue T-Pat, Garry Boo.

Anthracite Indigo Blue Check - Brian Cullen.

That is it for December 2016. There are of course a great many other genetic traits and variations of traits that could be included in this Issue . We have touched on a number of the most commonly seen ones . We thank all of the folks who have shared their Great photos from Facebook and other sources ! If I have any labels or Names incorrect , please do not hesitate to let me know .

Many of you around the world are planning to celebrate the CHRISTMAS season on the 25th. and We wish you a very Happy and Peaceful Holiday!

Tiger grizzle (Mottle) Omar Blw Danube -Pigeons Dino David Facebook.