The Pigeon Genetics Newsletter, News, Views & Comments.

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(Founded by Dr. Willard .F. Hollander)
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This Month we are "SPREADING" THE NEWS.

Recently on Facebook Pigeon Groups , there has again been references to "Spread " that have been causing a great deal of confusion! A couple of people who are using the term, simply do not realize that what they are saying is **incorrect**.

There are various ways spread is used when discussing pigeon colours and most of you will recall "**Smooth Spread**" ., and "**Coarse Spread**". These are in reference to the two distinct Pattern areas on all pattern series birds. They are the two types of colour pigment granules that make up the tail band , flights, and the wing shield bars and checks respectively, in fact all feathers have some of each!

Smooth spread refers to the colour pigment granules that we see as solid colour pigment in the Tail band and near the ends of all flight feathers. It tends to be "condensed" in its distribution there such that we see those areas as solid black, ash, or chocolate in colour depending upon which base colour that bird happens to receive genetically. These pigment cells are said by some to be slightly smaller than coarse spread granules and are laid down in a compact or condensed fashion. Others have said they are larger than Coarse spread , while still others say there is no visible difference.

Coarse spread pigment cells tend to be distributed in the feathers in a rather 'stacked' or 'packed' fashion compared to the neatly condensed smooth spread according to some who have viewed them microscopically. They are seen mainly expressing as the "C" (Pattern) areas of the wing shields, but again seem to be throughout all feathers to some extent.

BOTH are coloured pigment of whatever base pigment colour that bird happens to have inherited.

Then we have "**SPREAD FACTOR**" with the symbol (S). This gene is not a colour gene , **it does not have any 'colour'**. It is a 'distribution' gene that causes the condensed smooth spread granules to be evenly distributed throughout all feathers of the bird. This distribution is not always quite the same in coverage and often the coarse spread of the

patterns can be seen under it. The masking coverage is referred to as "Epistasis" whereby the patterns and other genetic traits may be "COVERED" by the smooth spread pigment.
Here are a couple of comments that have been made in reference to colour and spread, still being promoted to this day that are **wrong**!

Firstly, back in March 1998 one fellow wrote in this Newsletter to Paul Gibson then Editor : "You breed **black** pigeons that are not **spread**? Please tell me, how can that be? I for one have never heard of a **black gene**."
{ Here he demonstrates that he clearly thinks that wild type is caused by a "Blue pigment, that blue is a gene" and thus he is trying to take issue with the fact that the pigment is actually BLACK . He is also showing that he thinks spread means black. He does not realize that an all black pigeon may not necessarily be due to the spread factor influence, and that spread factor has no colour. }

Then he commented to me in a facebook group Jan. 20th. 2023 : " That IS NOT a Black Pigeon!!!! It IS NOT Spread!!!! { Here again he demonstrates that he still thinks, all these years later, that Spread is a colour and that spread means black which of course is completely wrong!}

Below we can clearly see all of the areas where **condensed** smooth spread pigment granules are deposited. They may be black, Red , or Chocolate in base pigment colour.

Regarding the Base Pigment Colours, I think it is worth repeating here that : In Science Pigment in Birds and mammals is referred to as Black, Brown and Red. However as you know in pigeons we have an unique situation whereby all colour is combined in one way or another with "Pattern", so that we have three base Pigments at the major colour locus and Four distinct Patterns of the (C) Pattern Series ,so we name the colour pigments as Black , Chocolate, and Red, then the pattern series Blue , brown, and Ash. Over the years some geneticists have gradually taken the position that the Base pigment and the Pattern series should be the same when the recessive mutation brown is involved, so tend to drop the term Chocolate that was named by **Chrietie** & **Wreidt** in 1925. I think **Christie** & **Wreidt** were correct.

Below photos 1 & 2 , these feathers show the condensed smooth spread distributions possible in tail feathers, (2) also shows what I believe is coarse spread patches basally. Photo 3 - look closely at the first

flight feather, you can see where this feather has a 'shadow ' of another feather that had been closed over it and had prevented some sun fading so that it looks like two feathers still overlapping. The ends are smooth spread with a very thin coarse spread tip. Confusion can also come when faded feathers appear to be brown. In addition chocolate feathers fade a great deal more than black and often may look like dilute brown (Khaki).



The first photo below shows some of the secondary flight coverates which actually are smooth spread and create half of the second bar pattern. * The second bar from the front of the wing shield , is one half coarse spread , and one half smooth spread. This is clearly seen in Ash-Red birds , and any birds where a gene whitens coarse spread such as we see here. On a normal wild type blue bar both bars would look like they are two long black bars. Many including Hollander and even my good friend Paul G. have shown diagrams that seem to suggest both bars are completely coarse spread but of course they are not.

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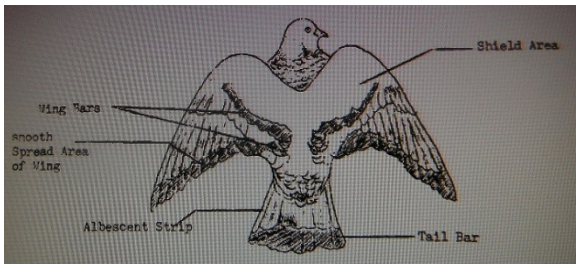
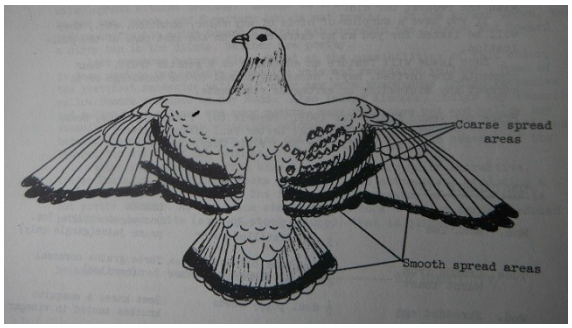
Coarse Spread is a distribution of pigment granules in the areas of the wing shield 'Pattern' which creates the main barred and checkered or (C) areas. The photo below shows the individual feathers of bar patterns, with the first feather on the left showing a checker pattern for comparison. Feathers 3&4 show secondaries with both a patch of coarse spread and one of smooth spread where the bars fuse.

Joe Quinn: Here he does not mention coarse spread in relation to either bar and shows sort of a union of the second short bar with the smooth spread of the flight ends labeled as smooth spread.



Hollander Excursions : I was unable to access his diagram , but I think it may be the same as Paul's.

Gibson Issue #3 - 1982. Diagram separates the two full coarse spread bars from the secondaries and primary ends altogether.



Rodgers : Below you can see that the second bar fuses into the outer trim of the smooth spread.

The checker pattern begins on the two outer edges of the shield feathers and advances inward to create darker versions of the pattern. Additional modifiers may be involved along with the coarse spread to cause the entire feather to be blackened in the case of a dark check , a T-Pattern , or a saturated T-pattern. More on that later.

Here we can see a partial third bar, then the first long bar , then a short second bar because the folded flights are hiding the secondary flight ends of smooth spread. The faint dark marks on the shields are caused by condensed smooth spread deposits of Sooty factor. These tend to darken with aging of the bird, sometimes so much so as to mimic a checker pattern. However in this photo it also may be an effect of smoky factor (sy) which sometimes looks similar to Sooty. We need to see more of this bird to be certain. Areas such as the albescent strips, the rump, and the very ends of the tail feathers will determine if the bird is indeed smoky factor or not...

There is still a great deal that we do not know about pigment distribution throughout all of the Pigeon's feathers. **Hollander** stated that both pigment granules were present throughout the entire bird. Editor Bob R. - { I agree , but from my own observations believe that condensed smooth spread may be deposited along the edges of the coarse spread patterns , and condensed coarse spread deposited in a thin line around the smooth spread tail band and feather tips. Hollander actually referred to these areas on the tail band as "THE SMOOTH SPREAD" pigment , but I suggest that it is actually coarse spread pigment.} Take another look at the frill stencil moon spots on the Tail feathers of a Blondinette. The actual "Moon Spot" is the condensed smooth spread that has been de-pigmented by frill stencil. However that white is encircled by a fine black line. If it was also smooth spread it would have been de-pigmented. Paul suggests that the smooth spread granules are "pushed" out to the edges by the whitening gene. This may be a possibility as we see something similar with the (St) gene white break that seems to push colour pigment into very dark versions of the base pigment to create the "flecks", but I think it is the coarse spread that is pushed out by (fs)in the case of the tail band and flight ends..

This clearly must be studied under modern day magnification to determine the exact reasons for the dark outer lines. **Dr. Gibson** states that the black line along the white bar indicates heterozygosis presence of the Toy Stencil genes. Here I think that it is the smooth spread that is pushed out to the edges of the (C) pattern areas by genes such as (Ts) and this smooth spread prevents the Ts bronze from expressing..

{We have repeated a few photos from earlier Issues - (1) because they best illustrate the topics, (2) we have many new members who may not have seen them previously.}

The rest of the tail feathers seem to be a combination of both smooth and coarse spread granules that only support the expression of Kite bronze if the concentration of 'coarse' spread is sufficient to allow that. Frill Stencil birds usually have a whitened basal area similar to Undergrizzle on each feather of the tail seen slightly here. Kite is not usually found on frill stencil birds. If there was a concentration of coarse spread basally , then I think the whitened base would not express and a bronze would be possible. Photo **Shoibal Sabbir**.

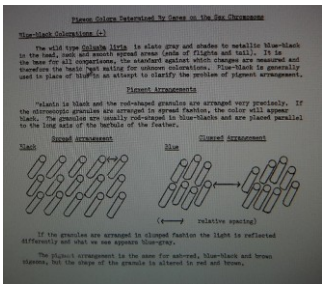
Gary Young wrote in chat 2/21/21

Dr. Metzelaar (1926) as published in American Pigeon Keeper, stated that color in blue or black pigeon feathers is caused by infinitely small black granules of pigment about one 10,000 of an inch in size. “These granules are clumped in little heaps in the blue parts and spread out evenly in the black parts; however, the amount of them is the same in both cases. The more complete this spreading is, the deeper the black will be. Intermediate hues between blue and black represent intermediate stages between clumping and spreading.” Dr. Sarah van Hoosen Jones in “Genetics”, September, 1922 pp. 406-507, stated that: “There is a wide range in the amount of blue which may occur, from full black, where no blue at all is present, to a type known as barless, in which nearly the whole bird is blue.” The inheritance of full black color has been shown to depend on a single dominant autosomal factor called the spreading factor and given the symbol S (Dr. Willard Hollander, in Genetics 23: 12-23). No visible difference is found under the microscope between black in different regions. But some sort of distinction does exist because the black tail band and black ends of the flights are unaffected by the presence of T-check, check, bar, or barless patterns which have been found to be determined by a set of autosomal alleles found on the same chromosome as the spreading factor. Dr. Hollander suggested that we call the pattern areas “course spread” to distinguish them from the smooth spread areas of the black tail band and ends of flights. But since the spreading factor has been universally shortened to the term “spread” in literature and common conversation, it causes confusion in peoples’ minds. Joe Quinn in his “Pigeon Genetic Handbook”, page 57, points out that we call the black areas on the wing bars and checks of a blue pigeon “course spread” but they microscopically differ little from other spread areas. So in other words, there is no microscopic difference between smooth spread and course spread.

Editor's comment { "I believe that **Dick Cryberg** says course spread pigment granules are larger than smooth spread and much easier to recognize under the microscope."

Gary says : I have great respect for **Dick Cryberg** and know he has taken some great microscopic photos of feather pigment. I do know from my own experience that the spreading factor inhibits gimpel bronze and messes up some of the other colors in my loft. So I eliminated it from my gene pool.

{ **Gary** got his information from a Website by **Arif Mumtaz**. There it states that **Cole** and **Hollander** were both wrong regarding the Smooth 'clumped' pigment granules , and the Coarse spread . Below is what **Joe Quinn** wrote in his booklet supporting **Cole** and **Hollander**. The difference seems to be that **Cole** and **Hollander** chose the term "CLUMPED" whereas **Cryberg** referred to it as 'ISLANDS' of pigment granules.}


Pigeon Colors Determined by Genes on the Sex Chromosome

Blue-Black Colorations (+)

The wild type Columba livia is slate gray and shades to metallic blue-black in the head, neck and smooth spread areas (ends of flights and tail). It is the base for all comparisons, the standard against which changes are measured and therefore the basic mating for unknown colorations. Blue-black is generally used in place of blue in an attempt to clarify the problem of pigment arrangement.

Pigment Arrangements

Melanin is black and the rod-shaped granules are arranged very precisely. If the microscopic granules are arranged in spread fashion, the color will appear black. The granules are usually rod-shaped in blue-blacks and are placed parallel to the long axis of the barbule of the feather.

Spread arrangement — Black

Clumped arrangement — Blue

(←→ relative spacing)

If the granules are arranged in clumped fashion the light is reflected differently and what we see appears blue-gray.

The pigment arrangement is the same for ash-red, blue-black and brown pigeons, but the shape of the granule is altered in red and brown.

Editors' Note : Regardless of whether the pigment is clumped, gathered, consolidated, assembled, deposited , or whatever, the important distinction between the light and the dark areas is that some areas of pigment have colourless areas between them whereas other areas have condensed

distribution. We therefore see the areas of considerable separation as 'blue", and the condensed areas as 'black'.

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Hi Bob - See attached I wrote this tonight after I saw you want to talk about Spread later this year , when is the deadline? so I can finish the report with pictures - Thanks - **Mike Miles** 4/13/2024

This is a very short version of my results trying to get Jet Black Homers from Dull Black birds.

I will tell you a little about myself. I started raising pigeons as a kid around 1968 the best I can remember. Always Homers throughout the years and lots of different breeds as well. I started to really enjoy the color genetics in the 1970's when I was in Junior High. Except for about 6 years I have played around with colors since then. Sometime around 1998 I received a coop full of black Homers, the dull black kind. I raised and have shown them. I would have to find my records but I really started trying to figure out how to change the dull black to shiny jet black around 2016. I call dull black slate black I think it's a better description, especially when you look at color charts.

My Shiny Jet Black Spread Project

I have had the same strain of black Homers with nothing mixed into them since 1998. They are a dull black as described by Sarah Jones research in 1922. The first thing I tried because I wasn't thinking was just keep breeding my blacks together hoping they would get darker and shinier. It didn't happen. I had tried siblings together and back crosses to their parents – no results. In 2016 I finally got serious about thinking how to make my birds Jet black (which I mean to say darker black and shiny). After my initial crosses I mated a black cock to a Blue Bar hen. My blacks were dull enough on most of them you could see the bars underneath the Spread factor. After a few matings I got two interesting birds. A blue check cock with bronzing seen in the bars region and a dirty blue bar hen. I wasn't expecting the bronze, as far as I can tell it is Kite. Further testing showed it acts like Kite, a dominant autosomal gene. I was also not expecting Dirty to show. At this point in time I was not sure what should be showing up from my testing.

I want to digress for a minute. I have asked many how to get Jet Black, the answers were all over the place. I've been told Dirty, Kite, Recessive Red, Sooty, Grease quills, just more factors, etc. would all make or improve to get Jet Black. So this was my starting point of knowledge.

To get a full understanding I have been breeding these blacks to each other hoping for a deeper and shiny black for years. Also during my matings, once I cross something into my blacks those birds are no longer used. I am trying to keep a pure strain of my original black this has been going on since 1998. I only have 5 or 6 of the original strain left.

Testing: Black cock to Blue bar hen resulted in Blue check cock with bronze. Also my first blue bar hen from the test carried Dirty. From the first test I realized Dirty and Bronze did not make my birds Jet Black. Next I tried taking the darkest birds with best iridescence and bred together thinking maybe saturation effect would improve them, I did this for 4 seasons. I did see a darkness improvement in some birds. As birds got a little darker iridescence showed better, it did not increase anywhere on the body. During the 3rd or 4th season I crossed a dull black which I could see the bars to a dark checked bird and on the young birds you could see it definitely improved the darkness of the young birds. So obvious now, use dark checks to improve the amount of underlying pigment in the check area. Dark Checking did not make my birds Jet Black but they were darker.
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So far I know the factors I have seen in my birds are Bar, Checker, Kite and Dirty. None of these factors have given me jet Blacks.

Testing Mother to son no results, Father to daughter no results, F1 x F1 no results. Black x Wild Type no results- none expected in this test.

In 2021 and 2022 I started trying other tests. I started crossing blacks to two different strains hoping to find an improvement- no results. Now I realized I needed to try other things. I got an unrelated Jet Black Homer from a Fancier named Mike Lopez. This bird was very black and shiny and had good iridescence in the neck area and along its back side. At the same time I was using a bird from Falcon Lofts which I was told carried recessive red I wanted to breed to get a recessive red bird. In 2022 I raised one recessive red and in 2023 5 more. These birds will be used to breed into my blacks hoping the ee will improve the Jet Black coloring in 2024 or 2025.

In 2022 I bred Mikes Black hen to a red check cock I had and got a F1 black son (heterozygous Spread) that definitely is blacker and looks close to a Jet black bird, better then my original strain of birds. Another ah ha moment my birds just don’t have the “it” factor to be Jet Black. After years of testing and then a test of a different strain of one bird easily changed the coloring in the first generation.

Next I bred this young black (F1) cock to a red check hen and got a nice looking hen darker black than my strain of birds but not as dark as her dad. Then in 2023 and 2024 I bred three youngsters from the F1 to a red check hen. These three birds are not as darker and shiny as the original hen. The Slate coloring is showing up in these birds.

Summary: From my testing I have not found Jet Black to be a sex linked factor. I haven’t found out what it is yet either. Jet Black is not a dominant factor over Slate that follows from one generation to the next.

Question, once I do more testing will Jet Black stay dominant over Slate Black? It does not appear so in my testing 2022 and 2023. Is it a different allele? I haven’t tried testing for it yet. Is it a combination of factors? I don’t know but my guess is it could be.

I have more testing to try, I have Sooty, ee and grease quill birds in my loft to try mating to my Slate birds still. From having sooty in other birds I don’t believe it will change the Slate to Jet. After years of breeding LFCL Tumblers with ee and Black I think ee might have a chance to improve the Slate. I have no experience breeding grease quilled birds but I have been told by several it will improve my Slates.

This is a shortened report on my testing of Slate Black from 1998 to 2024. More testing to follow.

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{Editors: - Reading back over the years , **Paul Gibson** at one point stated that the flesh coloured beaked deep recessive reds will improve the blacks to be Shiny deep blacks with the flesh coloured beaks. Smoky was also thought to be part of that genome. I will attempt to locate that as I may have it incorrect.}

The Lahore of old had excellent deep black colour , and recessive red was all but unheard of in the breed. Sooty is and was rather common in the Breed. Milky was very common but smoky not to my
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knowledge. Grease Quills were not ever seen in the Breed , and I am of the opinion that they are a result of very oily shiny feathering and NOT the cause.

Here are a few solid black Spread factor (S) birds with light coloured beaks and orbital eye skin.

Mick Bassett photo .

Charkovsky Sametovy

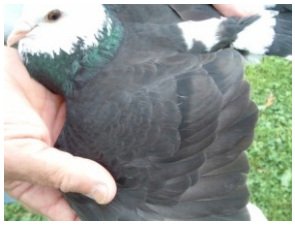
Mick Bassett photo

Black Beak and eye cere Shiny Blacks. **Mick Bassett** photos.

Below Dull black : In the case of the pieds the beaks are usually light or partly light regardless of darkeners such as Dirty factor (V).

Bob R .

Mohammad Atiq



Incomplete (S) blue/Black - Bob R.

Years ago **Paul Gibson** was at a show when approached by a fellow asking him about a phenotype of a bird that looked more like a Dun but expressing bars. **Paul** told him it was a Spread factor bird and that when mated to a blue bar , it would produce solid blacks and breed as a homozygous spread factor bird. We have reported on this a number of times since in this Newsletter both when Paul was editor and again when I took on the task. I had a slightly different experience in that mine were either Black or dun as seen here with the Baldhead black above. They did breed as pure black or dun as well as barred but did not breed as checkers due, I assume, to the trait (S) being linked to pattern in the specimens that I produced. We called the trait "Incomplete Spread factor". Some felt it was just 'unimproved Spread" , but there was a difference. The bodies of these birds expressed a deep even colour throughout as opposed to the range of tones throughout an 'unimproved' bird.

I think that some of the birds I have seen pictured as being "Incomplete (s), were not at all and would have been better described as 'unimproved'.

The following photos may show what I mean: Full siblings - Cock black, hen Dun. Mated to check pattern offspring were Solid shiny Blacks photo 3.. Spread is linked to pattern , so the offspring are barred.

Below 'unimproved (S) showing the variations in tone throughout similar to sun fading but not.

Sarowar Salman

Jith Peter-(S) hetero Lal Band.

Now what about the shiny black phenotypes that seem to defy explanation ... are they actually a type of Spread factor? Lets have a look.

Breeder **Rob Grogan** Photo **Mick Bassett**

The ESFT Breed has what is reputed to be a Dark Check (CDk) pattern yet the entire bird is solid black in most cases with a high sheen and usually hints of red (phaeomelanin) over the black . This is proclaimed by Almond breeders to be Kite bronze. These birds usually are heterozygous for recessive red. No one knows and therefore cannot explain what causes these birds to be such a solid black. One suggestion, (I believe by Robert McKee) was that the deep shiny black came from very early infusions of the pigment that causes the Gimpel Archangels to have their black wings and tail colour. These birds usually are (CDk) also as has been proven when mated to Blue Barred test birds. The idea that Sooty , smoky, and Dirty are the modifiers that cause this 'black' phenotype has been studied. Smoky (sy) has been segregated, as has Dirty (V), but Sooty (So) has not been found to normally be present. SO, the question remains, what causes this solid black phenotype when it is not the typical Spread factor (S). Spread factor (S) has been introduced to the Gimpel Archangels to make solid black archangels without any bronze. That is because (S) masks Kite Bronze (K) which seems to be the main bronze involved. The head, neck, and under-body bronze (Ka1 and ka2) are considered as a nebulous bronze but also have the symbol (K).

It is interesting , at least to me , that when Indigo is added to the ESFT (CDk) Dark check, the offspring may be Andalusian , just as would happen with Spread factor (S).

This entire topic caused me to hypothesize that we may have another form of Spread Factor whereby the "Coarse spread" pigment was covering the entire bird rather than the usual Smooth Spread. That would have to be put through some sort of rigorous testing and study of the pigmentation under very good microscopes in a Lab. All of this testing and study research costs money!

We will again visit the "PATTERN" series in the New Year. The range within the series is far greater than simply Light, Medium, Dark checker and T-Pattern. We have learned from the research by the University of Utah that the checker pattern was 'introduced' from another Pigeon species and that it did not mutate at the Columba livia pattern locus. Both T-Pattern and Saturated T-Pattern have no symbols and may be created by the addition of darkening modifiers, but again that has been tested to various degrees without a great deal of difinitive success.

So, to say that we are 'in the dark', when it comes to understanding the 'darkening' genes involved in solid black pigeons, is an understatement! I have seen it written that bronze helps to darken black , there is absolutely no evidence that that is true as you saw in Mike Miles' article beginning on page 6 .

***To summarize**: Spread factor (S) is not a colour gene, it has no colour. It simply is a 'distribution' gene that enables a specific type of colour pigment granules to be dispersed throughout all feathers such that no Pattern variation can easily be seen. This condition is known as 'epistasis'.*

There are two main types of pigment granules produced throughout all feathers of Pattern Series birds : Smooth spread , and Coarse spread.

Smooth spread is condensed in the Tail band , and along the ends but not the extreme tips of all flight feathers. It can be found in all other feathers (Hollander) but in a scattered manner.

Coarse spread is found specifically in the "C" areas that make up the 'Pattern' on the wing shields and also at the tips of the flights as well as basally in the tail feathers of some birds. Otherwise it is also scattered throughout all feathers (Hollander).

I have suggested that there may also be a type of Spread factor that distributes the Coarse spread so that it is dispersed throughout all feathers evenly such that it also can cover everything else to create a solid black bird. Testing for this may have to be done in a lab only , but you may want to check deep shiny blacks to see if any pattern can be detected underneath. It may be possible that only the smooth spread covering will allow the coarse spread underneath to be visible.

Ash Red birds that are deep solid red may be Spread coarse spread factor, otherwise they would be spread ash in phenotype. Mated to blue bar they may produce deep shiny blacks if Spread coarse spread. This would be a new factor to us but may have been under our noses all these years. It would be fun to check it out.

We probably would also benefit greatly if we had people testing for CNV, Copy Number Variant in the Spread factor birds that are expressing each of the three main colour pigments at the major colour locus.

This result may help unravel just what components prevail in the pseudo blacks that are not spread such as the blackwing Archangels (Gimpels) , and the Saturated T-Pattern blacks used in the Classical Almond breeding programs of the Stipper family.

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Next Month we revisit the topic of Phaeomelanin as we are "Seeing RED". This will include the bronze factors and everything that causes feathers to express a red colouration as opposed to the 'eumelanin' of the blue/Black, and brown/Chocolate colour series birds. If you have anything to offer in the way of information, experience, or photos , please send them along to either me or Shoibal. We will be happy to look at what you have and use any material that is helpful in any way!

Until then , that is it for August, stay well and stay safe !
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