

The Pigeon Genetics Newsletter, News, Views & Comments.  
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This Month we present another one word Topic , and that is 'EPISTASIS' , it may be more familiar to you as Masking or hiding. No it has nothing to do with Covid - 19 ! It is a term used to describe certain colour traits that prevent us from seeing another trait or traits that are present.



Here is one for the Books .. **Guido Madrusan** is keeping some Zitterhalls for a friend and getting some deep reds (Intense) that are naked in the nest! See adult further down below.

**The Meaning of Epistasis : the interaction whereby the phenotypic expression of one or more genes is suppressed by another non-allelic gene.**

In the Pigeon Hobby the term Epistatic means to Mask or cover. It pertains to any colour trait/ modifier that prevents us from seeing both the base colour and the Pattern that we know is expressing underneath. The two main traits that are considered epistatic are Spread factor , and recessive red/ yellow. Many have in the past also considered 'white' as being epistatic ., but I and some others disagree with this notion as one cannot mask , cover , nor hide that which is not there to begin with and white is the result of a specific genetic condition that stops colour pigment from being deposited in the skin and feathers so there is nothing there to be masked over.

The situation regarding spread factor and recessive red / yellow is quite different. These two modifiers have a masking capability, yet are quite different from one another. While recessive red can MASK spread factor in all three base pigments , Spread factor birds can only carry the recessive red factor and cannot mask it. The two reds below could be masking black birds and be of any pattern , but the blacks can only carry the recessive red gene at the Sox 10 locus , and be of any pattern. Photos (1) & (2) **Fahad Pigeons Loft**, recessive reds and Spread blue/Blacks. Photo (3) **Mick Bassett**, recessive yellow ( dilute recessive red). (4) **Shafik Pigeon Loft**, Dun. ( dilute spread blue/Black).



Yellows and Duns ( the dilutes of red and black), work exactly the same way.



You will recall that both I and **Paul Gibson** have stated in the past that we considered Ecu as an epistatic trait. Like recessive red and spread factor it does not successfully hide pattern or even base colour etc ., in its **basic form**. They all require modifiers that will enhance their colour effect in order to fully mask or cover other traits that may be present. In the case of both recessive red and spread factor, we refer to the non-masking expressions as 'unimproved'. Should we discover that Ecu is indeed an epistatic trait and aim to make it cover whatever traits that are present, we will have to discover what modifiers are required to bring about more of the buff creamy Ecu expression or which modifiers react the same way during oxidation.

**Hein Van Grouw** and **Andreas Boisits** are two who disagree with us on this hypotheses. I think that IF I were to show them both an unimproved spread factor bird and an unimproved recessive red or yellow BEFORE they had ever seen the modern day deep expressions of those traits and asked them if those traits were epistatic , it is for certain they would say no as well. We have to see the result of successful work to enhance the Ecu colour to be able to make a judgement. That work has not yet been done nor has anyone thought to even try it. However here is what they and **Ash Hammett** had to say :

Hey Bob.

Interesting newsletter, as always.

Attached are a couple of my young female Horseman Pouters you might find interesting. One is a t-pattern and one is a checker. They are both hens; they'll get bred back to their uncles later this summer and hopefully have some extreme dilute sons. The check hen has just laid her first eggs, but I'm going to let her sit on dummy eggs for the first nest. Don't want to rush her too much!

I'll have to reread all that stuff in the newsletter a couple of times to get my head all the way around it, but **I know for absolutely certain that ecru is located on the sex chromosome and I firmly believe that it is the same mutation that makes the traditional "white" ringneck dove.**

I E *extreme dilute*.

The vast majority of "white" ring necked doves are extreme dilute. Ringneck breeders worked this out a long time ago. It is completely logical that there is a mutation at that same locus in Columba Livia that would produce extreme dilution. The shade of beige on the neck ring and undertail bar on a ringneck dove is *exactly* the same as the pattern areas on an ecru pigeon.

The traditional and most common "white" ringneck doves have totally normal eye color as adults and no vision issues.

The *only* way to make a pure white ringneck dove with *no beige* coloration on the neck ring or undertail bar is to combine extreme dilute with another mutation such as tangerine or frosty or pied. Again, Ringneck dove breeders worked these factors out years ago.

LEMON is a *terrible* description for the extreme dilute mutant in pigeons.

Ecu (beige) is far more accurate.

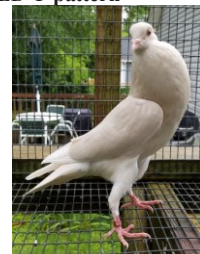
ANYWAY, thanks for the newsletter, I love reading them and learning more every month!

-Ash

ED blue check



ED T-pattern



Hi Bob,

I hope you're keeping well. Thanks for the Newsletter! Unfortunately I never received the email you referred to in your email from the 19<sup>th</sup> of May (Hi , I sent an email to you without any reply , I suspect your office is closed . Just thought I would try again. ) Indeed, the museum is closed for staff and public, but we do work from home and I do access my emails. Anyway, pity I did not get that email, but you did a good job with the newsletter so no complains (though..., perhaps a small complaint 😊) the photo of the spread ash Lemon /Ecrú/ extreme dilute on page 2 was by me and NOT Andreas Boisits.

**I still do not agree with Paul Gibson's statement that there is no (hardly any) difference in colour between ED on Ash-red and ED on Blue.** Compare the attached photos of an ED ash-red chequer and an ED blue chequer. Although perhaps not an extreme difference but still, in my opinion, a clear difference in colour. Also, in my opinion ED has less effect on the phaeomelanin (Ash-red) than it has on eumelanin (Blue), as also can be seen in these photos. If you consider the difference in colour between black patterns in blue and the colour of the patterns in ED blue, then the black appears to be much more affected (paler) by ED than the original red pattern in an ED ash-red. The ED ash-red is not much lighter in colour than a Diluted ash-red (see photo).

The pigeons in these photos are all siblings. The parents were an ED ash-red spread cock (in fact the bird in the photo you credited to Andreas) and a Diluted dark-chequer blue hen. I made this crossing last year to get more evidence (although I didn't need it) for ED and Diluted being alleles. As expected, from this pair is I got only diluted males (8) and ED females (6).

This year I bred, by accident, two ED Anthracite Blue Spreads. These are very, very light cream-coloured; almost white. Rather pretty, but not a combination I wanted really.... Anyway I can use them for breeding more Anthracite Spread next year.

All the best for now.

Cheers.

**Hein**

ED ash-red check hen



ED blue check hen



dilute ash-red check split ED



It is very difficult to tell likenesses and differences by photos alone . To me the lighting in these photos is giving somewhat different phenotypes than anyone else has ever shown in their Lemon/Ecrú specimens. The blue checker looks more like a brown checker Ecrú. Last issue I ran some photos together in an attempt to demonstrate my point ( Bob R.)



Comment by **Andreas Boisits** : English edited -

Thank you for sharing your theory of ecru being possibly epistatic to patterns with us. In my opinion and experience this is not the case. Sometimes it is not so easy to distinguish phenotypically between unimproved spread ecrus and clear non-spread ecrus. The reason in my birds is the following: At the beginning of my project I only bred non-spread ecru (only bared and checkered ones). To introduce the spread factor, I simply caught an unimproved feral hen nearby the Austrian city Salzburg (see enclosed picture nr. 01760), and crossed it into my stock of non-spread ecru birds. My idea, to use an unimproved black, for introducing spread into my ecru was, that we might achieve a lighter ecru colour this way. The result was a light ecru colour but also sometimes my spread ecru have bars or checker slightly shining through. So it might have been better to introduce spread by using not an unimproved but a shining clear black bird. All spread ecru in my flock originally got their spread gene from the black feral hen from Salzburg. Never since I crossed another spread bird into my ecru stock. So, the bird on the third picture, that you published in the May issue is simply a spread ecru. It is not an ecru that is made epistatic to pattern by means of selection.

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Let's look carefully at just what each trait does or does not do:

**Spread** ~ covers pattern and can make: Blue series solid **Black**, Ash series solid **Ash**, and brown series solid **Chocolate**.

**recessive red** ~ covers pattern and the three base pigments to all appear as **recessive red**.

**Pale factor** ~ hetero or homo does not cover Pattern, and has a decidedly different phenotypic colour effect on all three base pigments. ( pale black = **dark dun**, pale ash = light **gold**, and pale chocolate = **drab**), pale factor turns rec. red to **dark gold**.

**dilution factor** ~ hetero or homo does not cover pattern , and has a decidedly different phenotypic colour effect on all three base pigments. ( dilute black = **Dun** , dilute ash = **cream** , and dilute chocolate = **Khaki**), dilution turns rec. red to **yellow**.

**Ecru** ~ Homo or hemi, partially masks Patterns, and has the same effect on all three base pigments as well as on Spread , and recessive red in that they all appear as shades of **Ecru** nothing else!

From this we can see that Ecru is most like recessive red in its manner of changing or masking all traits in an uniform fashion. Is it truly 'epistatic' ? Time will tell. ~ Bob R.



Pearl eyed whites Photo by **Khalifa Lalit Khan**.

Genes that whiten , stop pigment production or de-pigment , and thus it is my contention that white does not mask anything because there is no expression for it to cover. White is the result of nothing being present to absorb or reflect colour. Therefore white is not epistatic. We know that genetically speaking something else must be in the genes , but that something is not being expressed or covered.

Comment from **Hein** :

Me too cannot understand, because of the reasons you perfectly worded, why people consider recessive white being epistatic. However, funny enough, I'm not aware of Albino ever to be considered epistatic by pigeon keepers, whilst in an Albino the same thing happened (although with a different nature); there is no colour present. **Hein Van Grouw**.

**(NEW recessive red mutation , or an old one just being discovered again ? OR is this a Chocolate brown , as suggested by Charles Kendrix in the facebook discussion on this photo. )?**



This is the adult version of **Guido Madrusans** post in "Strictly Colour Genetics " You could see that Dirty is not present by the pink feet of the downless chick. Here

you also can see a flesh colour beak and eye cere. The red colour however is very Intense. Recessive red has mutated several times at the Sox-10 locus , so perhaps this is a separate mutation allele that we have not dealt with previously.



Here is a photo sent by **Octavian Sarafolean** , to my Facebook Group "Strictly Colour Genetics" ,. This is a young Ecu Ash -Red hetero blue /black. Note two interesting features. (1) the black feather near the shoulder, and (2) the pink and light iris eye colour. I suspect that the feather is due to somatic mosaicism involving a very small area of skin to include and affect only the one feather.

However the pink eye makes me think again ( not to be flogging a dead horse) , that Ecu IS in fact (ino) and that ino is NOT pigeon dilution , but instead a new mutation Locus in pigeons that produces forms of albinism so close to the dilution locus that it may not be possible to separate them in breeding tests. I realize that Hein's results above seem to negate that notion , but still for me something does not add up!





We need YOU the Breeders of the three base pigments , and the phases 'pale'. 'dilution' and 'Ecrú', to start recording your results more carefully by taking photos of the eye colour from day one of hatching. Please send the results to us so that we can present it in a future issue.

We have to accept the breeding results of the various people who have worked with Lemon/ Ecrú, to be correct in that (1) it is without doubt a sex-linked recessive gene, that was long ago proven back in Africa. Then there is very strong evidence that (2) it is an allele on the Pigeon dilution locus as we presently know it, and accept as THE correct designation.

We must remain open minded scientifically speaking , to the oddities and contradictions that a number of well meaning and experienced genetics Breeders have noted in their tests.

We also must remain open minded to the fact that certain aspects of this phenotype lend themselves to being further developed such that the Muslin/ Ecrú colouration may well become saturated to the point of being epistatic to all colours and patterns.



Now let's take another look back at Unimproved recessive reds , and unimproved Spread factor birds.



AK Lofts .



Jith Peter.

Selection for deeper reds and yellows with the addition of other modifiers such as Dirty factor , various bronzes and other traits have enabled Breeders to completely mask Patterns and base colours .



Photos by **Mick Bassett**.



Unimproved spread factor blue bars and Khaki Bar . (First two by Jith Peter.)



**Sarowar Salman Farabi**



**Gary Keith** (may be smoky).



**Arkadiusz Zajac RP RCH.**



**Bob R.**





Heterozygous Spread factor Black & Dun that were bred by Vicki Colpits of New Brunswick Canada , two expressing an unimproved phenotype that allows us to fully see the bar pattern. The adult hen would be hetero spread fully masking pattern and their black son ( top right) would most likely be homozygous for spread factor also fully masking pattern.

No one seems to know exactly how to take an unimproved spread factor Blue , ash, or brown series bird and render its offspring solid Black , Red , or Chocolate. We know that the phaeomelanin spread Ash is still going to appear 'ASH' and why, so they may never be solid dominant RED. The eumelanin Black and Chocolate birds are however another matter ! There have been comments that modifiers such as one or more Dirty factors may have to be used. There also have been comments suggesting that all three modifiers Dirty factor (V) , Sooty factor (So) and smoky factor (sy) MUST be added to change a hetero spread into a solid Masking homo spread expression, and the homozygosity alone is not enough .

A similar dilemma exists with the Black Kites of the Almond ESFT breeding programs and the black wing Archangel /Gimpel colouration. Getting and maintaining the deep black presents similar challenges. The experienced Breeders know, that by careful selection for the best desired expressions, they can MAINTAIN what they have , but they have no idea how to create it in the first place , nor how to regain it if lost , except again by selection phenotypically.

The knowledge of the "genetics" involved remains a mystery tracing back centuries !



A hetero spread factor cock sired by a black Lahore out of a blue white bar Saxon Monk. The oddity with this fellow is not so much that his spread does not mask pattern , ( which is common with hetero spread birds , but not a given), rather it is the fact that he bred on as if he were homozygous for spread factor. He did not ever produce any non-spread bar or check offspring from Patterned females. This suggests that there are yet to be tested and yet to be discovered traits , perhaps alleles of some well known established modifiers , that we simply do not recognize as being significantly different or unique.

Below we have repeated a few photos just to enlarge them and bring attention to the fact that while some do look slightly different, they still are all amazingly similar in colour tone. However we are also observing them via photos reproduced on a computer , and taken by various cameras at different times and in different lighting.

The first two Blue Checkers appear to be Ecu , but the first one nearly covers the pattern while the second appears to be more like a brown series Ecu specimen showing more pattern.





Ecru Blue chk . **A.Hammett**.



Ecru Blue Chk. **Hein VanGrouw**.

Both reported as blue checkers for certain. ( We know that even normal blue checkers can vary).



Ecrú Red Chk. **Hein Van Grouw.**

Ecrú Ash series birds have naturally no smooth spread or clumped smooth spread distinct colour to express a specific base colouration, thus a whiter tone of Ecrú. The Coarse spread areas closely resemble dilution with a slightly more Muslin tone

Finally a word to some of you who are just starting to get involved in describing phenotypes to your friends and others. "The base pigment granules that normally are found concentrated in the tail band and flight ends (not necessarily the very tips), are already present in all feathers but distributed in various amounts and clusters." **SPREAD FACTOR is a mutated gene that evenly spreads additional smooth spread granules so that we see this evenly distributed colouration over the entire bird.** However it is as if it sometimes fails to completely cover or mask the Pattern that also is present underneath. **This pattern is caused by darker areas of each feather on the shield in particular , that are the result of another type of pigment granules called COARSE SPREAD.** These pigment areas are combined in set patterns ( Bar , checker, and T- Checker) along with the SMOOTH SPREAD granules gathered or clumped on very light areas of no pigment. When the light and the dark areas are together, we perceive them as gray or blue. The overall tone of spread factor is that of 'BLACK' for heterozygous or homozygous blue series birds, Then an overall tone of 'Ashy gray' in the case of Dominant Ash-Red series birds , and overall 'CHOCOLATE" in the case of brown series birds. Heterozygous birds have only one dose of that spread gene so are more likely to allow the pattern to be visible. Homozygous Spread factor birds have two doses , one from each parent , so they may very well be much more evenly dark "SOLID" colour, Other modifiers that may be present or absent can play a role in this epistatic ( masking) (Covering ) effect.

Well there you have it for another Month.. See you again in August! Special thanks to those who have photos in this Issue to help us show what we intend to convey! All the Best around the World ! ~ Bob in Canada and Jith in India.