

GOLD GLORY: GENETICS OF THE VIZSLA COAT COLOUR – PART II

I am grateful to Professor Sue Ann Bowling and Dr. Bruce Cattanach** for their useful comments on the draft of this article. It goes without saying that responsibility for any remaining error or inconsistency is entirely that of the author. I have deliberately chosen to limit the number of footnotes in the text. Instead, of referencing the many statements concerning coat colour genetics throughout the article, a bibliography of the works relied upon in its preparation is appended to the article - F.-R. Bernier*

Part I of this article identified three possible explanations for the colour of the Vizsla coat. The first of these is Professor Robinson's hypothesis that the Vizsla is a dominant yellow (A^y - bb) breed. Then, we have Professor Willis' suggestion that the Vizsla is a recessive brown (bb) breed, a suggestion endorsed by Professor Zöldas in his presentation to the 1999 International Conference of Vizsla Breeders. The third possibility, and one alluded to by professor Zöldas, is that the Vizsla is a recessive yellow (ee) breed. In this second part, I review the reported results of various crosses involving a Vizsla with a view to determining which of these three hypotheses is correct.

DOMINANT YELLOW HYPOTHESIS

Two crosses between black and tan breeds and the Vizsla gave results that are not compatible with the dominant yellow hypothesis. A mating between a Rottweiler and a Vizsla produced 8 puppies, 5 of which were black with tan points and 3 of which were solid black. A second mating between a Doberman and a Vizsla also resulted in a litter of 8 puppies, with 2 puppies being solid black and the remaining puppies black with tan points.

These two black and tan breeds are homozygous a^1a^1 . Keeping in mind that a^1 is the most recessive allele at the A locus and that A^y is dominant to it, a mating between an A^y Vizsla and a Rottweiler or Doberman should not produce any black dog with tan points. In fact, as seen in Table 2, all dogs from such crosses ought to be yellow (A^y) although all would carry the recessive a^1 .

Table 2

<i>Rottweiler x dominant yellow Vizsla</i>		
	A^y	A^y
a^1	A^ya^1	A^ya^1
a^1	A^ya^1	A^ya^1

* *Prof. Bowling, retired Assistant Professor of Physics at the University of Alaska, is a breeder of Shetland Sheepdogs and has a longstanding interest in breeding and genetics. She authored and maintains a website that deals extensively with canine genetics at <http://bowlingsite.mcf.com/Genetics/Genetics.html>.*

** *Dr. Cattanach is a professional geneticist and was most recently Director of the Mammalian Genetics Unit of the UK Medical Research Council. Dr. Cattanach is also a breeder of Boxers and initiated the famous Bobtail Boxer project. Dr. Cattanach maintains a website for his Steynmere Boxers at <http://www.steynmere.com>.*

I have assumed here that if the Vizsla were an A^v yellow breed, it would be homozygous A^vA^v . If not, and some other alleles of the A series recessive to A^v were also present, there should be a number of puppies born carrying two copies of that recessive and of a different colour than golden rust. For example, if a number of Vizslas were A^a instead of A^vA^v , at some point Vizslas would be produced that are a^a or black and tan, which would be brown with tan points in the case of the Vizsla due to the effect of b on the black pigment. As this has not been known to occur in the breed, I have dealt with the Robinson hypothesis on the basis that it supposes homozygosity for A^v .

For both black and tan (a^a) and solid black puppies ($A^s a^a$) to have occurred in the two litters mentioned above, the Vizslas involved had to be $A^s a^a$ since the black and tan Rottweiler or Doberman can only be a^a . In the case of the Doberman x Vizsla litter, one solid black puppy was examined at my request and it was found that there was a slight reddish tinge to the hair in those areas where tan points normally occur. This can also be seen on a colour photograph in my possession. Robinson and others have commented that this is typical of dogs that are $A^s a^a$. Obviously, if the Vizslas involved in these crosses were $A^s a^a$, they could not also be A^v as suggested by Robinson.

RECESSIVE BROWN HYPOTHESIS

The fact that the Vizslas involved in the Rottweiler and Doberman crosses both carried the dominant gene for solid black (A^s) and yet were the colour of a Vizsla, brings us naturally to the hypothesis put forward by Willis and Zöldas that the Vizsla colour, like that of the Chesapeake Bay Retriever, is due to the dog being homozygous bb. According to this view, the Vizsla is essentially a brown dog. This hypothesis supposes that the Vizsla is also A^s as the b recessive acts on black pigment.

But if Vizslas were $A^s A^s bb$, how do we explain the occurrence of black and tan puppies in the Rottweiler and Doberman crosses? The cross of an $A^s A^s bb$ Vizsla with an a^a BB Rottweiler or Doberman should result in complete litters of $A^s a^a Bb$ puppies, which would be solid black. But what if the Vizsla were $A^s a^a bb$? An $A^s a^a bb$ Vizsla crossed with an a^a BB Doberman would result in half the progeny being $A^s a^a Bb$ (solid black) and the other half being $a^a Bb$ (black and tan). The problem is that explaining the results of crosses this way supposes the Vizsla to be invariably $A^s a^a$. Obviously, that would not be the case and in time, we would have a proportion of Vizslas that are $a^a bb$. This is the same genotype as that of the red Dobermans and it seems most doubtful that the colour of the area normally black on a black and tan dog would be so identical to that of the tan points as to be undistinguishable from the colour of those points.

An Irish Setter x Vizsla cross also contradicts the bb hypothesis. Irish setters are considered to be an ee yellow breed. They will be $A^s BB ee$ (black nose leather) or $A^s bb ee$ (liver nose leather). If the Vizsla were $A^s bb EE$ as proposed by Willis, the Irish Setter x Vizsla cross should result in the loss of the golden rust coat colour in offspring that are $A^s Bb Ee$. A picture of a puppy from such a cross that was sent to me, however, shows a dog with the very same coat colour as that of an adult Vizsla lying next to it. That the puppy is B- rather than bb is shown by the fact that it has a black nose. Yet it has the Vizsla coat colour. This result is not consistent with the view that the coat colour of the Vizsla is a result of it being a bb breed.

It is worth pointing out here that the results of the Irish Setter x Vizsla cross are also incompatible with the Robinson hypothesis that the Vizsla is an A^v yellow breed. If Robinson were right, the Irish Setter x Vizsla cross should result in solid black puppies ($A^s A^v Bb Ee$).

RECESSIVE YELLOW HYPOTHESIS

The recessive yellow hypothesis is the only hypothesis that is consistent with all the Vizsla crosses of which I am aware. The result of the Irish Setter x Vizsla cross supports this view. The mating of an Irish Setter that is $A^s B ee$ to a Vizsla that is $-- bb ee$ would explain a puppy that has the same colour as the Vizsla but with a black nose.

Results of a reported cross between an orange Pointer with brown nose and a Vizsla are also consistent with the hypothesis that the Vizsla is an ee breed. The Pointer in this case would be $A^s bb ee s^p s^p$. All 8 of the offspring of

this breeding have been reported to be like the Vizsla as far as coat colour is concerned, although with more white as might be expected from the Ss^p combination.

The ee hypothesis is further supported by Labrador Retriever x Vizsla crosses. Labradors have four genotypes:

Table 3

<i>Colour</i>	<i>Genotype</i>
Black	A^s - B- E-
Liver	A^s - bb E-
Yellow w/ black nose	-- B- ee
Yellow w/ liver nose	-- bb ee

A number of crosses between black Labradors and Vizslas have been reported. One resulted in 3 solid black pups. A second also resulted in a solid black puppy. Finally, a purebred Vizsla female gave birth to a litter of 7 after being mated by a purebred Vizsla one day and a black Labrador on the following day. This last litter included 3 puppies with the Vizsla colouring, two black puppies and two "yellow" puppies. Note that the yellow puppies had black noses so had to be sired by the B- Labrador rather than by the bb Vizsla. It would appear likely that the Vizsla male to which the dam was first mated was in fact the sire of the first 3 puppies. Of interest in this case, is the fact that this mating produced "yellow" puppies. Black Labradors that are EE cannot produce yellow puppies but black Labradors that are Ee rather than EE will produce some "yellow" puppies when mated together.

Table 4

<i>Ee black Lab x Ee black Lab</i>		
	<i>E</i>	<i>e</i>
<i>E</i>	EE	Ee
<i>e</i>	Ee	ee

That a mating between a black Labrador and a Vizsla would produce yellow puppies serves as further confirmation that the Vizsla is ee. For the black Labrador to produce yellow, he would have to be Ee. For a yellow puppy to be produced by an Ee dog, it must be mated either to another dog that is Ee or to one that is ee.

Unfortunately, the few reports I have concerning yellow Labrador x Vizsla crosses are not amongst the most reliable I obtained. A puppy from such a cross was said to have been "Vizsla colored". The puppy had a liver nose. I have not been able to verify the particulars of this report to my satisfaction. I also have another report about a yellow Labrador x Vizsla cross that produced 8 puppies, all of which were "colored like Vizslas" and with liver noses. The reporter did not personally observe these puppies. If correct, this last report would provide further evidence that the Vizsla is indeed ee. If the Vizsla carried the dominant E at that locus and was bred to a bb ee yellow Labrador, one would expect to see black puppies (in this case brown because of bb) from such a mating. If all puppies from a sufficient number of such crosses were yellow, this would confirm the Vizsla as an ee yellow breed. At the same time, based on the absence of any black puppies, it would confirm that the Vizsla is not an A^v yellow breed..

SOME OTHER CROSSES

While they are not directly relevant to the question dealt with in this article, I thought Vizsla fanciers might be curious about the results of other crosses that were brought to my attention.

Weimaraner x Vizsla

Reported crosses of the Weimaraner and the Vizsla give puppies that are uniformly brown. Genotype for the Weimaraner is $A^s-bbddEESs$. Crosses with a Vizsla have produced results consistent with the ee hypothesis with solid brown puppies of the $A^s-bbDdEeSS$ genotype.

German Shorthaired Pointer x Vizsla

Three reported crosses: one giving a singleton pup, one producing 5 puppies and the third producing 12 puppies. All were solid brown as expected when breeding two bb animals, one of which is also SS . Most Shorthairs would be A^s at the A locus, but a a^1 apparently occurs in the breed. The German Shorthaired Pointer being an EE breed, all puppies from those crosses would be Ee , which explains the complete absence of any puppy with the Vizsla coat colour.

Unknown x Vizsla

A purebred Vizsla whelped a litter of 10 puppies which were described as follows: "one black with tan points, three "solid" black (if you looked at them in bright light you saw "shadow" tan points), two GSP-type liver with "shadow" tan points, remaining pups all merle (some blue merle, some red merle) with tan points". Later, I was informed that as the puppies grew, the tan points became more clearly defined on the three black puppies and the two liver pups. In this case, assuming a single sire, all 10 puppies were a^1a^1 , which suggests that the Vizsla dam was herself homozygous a^1a^1 . Of interest here is the confirmation that a Vizsla carries a a^1 at the A locus, something learned from the Rottweiler x Vizsla and Doberman x Vizsla crosses discussed above. The presence of 4 merles in a litter of 10 is fairly close to the expected 50/50 ratio that would be expected from the breeding of an Mm dog to the mm Vizsla.

CONCLUSION

Based on the information provided here, I conclude that the Vizsla is in fact a recessive yellow or ee breed. The available data from various crosses has not only allowed us to determine the genotype of the Vizsla's coat colour but has also served to identify at least two of the alleles which are found at the A locus in the Vizsla. The reported crosses establish that both A^s and a^1 occur in the breed. Other crosses would be required to find out more about the breed's genotype at that locus. For example, we can speculate that the sable A^v is also a possibility. The sable gene, if it is present in conjunction with ee , could perhaps account for the lighter shades of some Vizslas. This article also did not deal with the modifiers that undoubtedly play a part in the final result.

Knowing that the Vizsla is a recessive yellow breed provides a rational basis for discussion of unexpected colour markings that may occur and allows us to ascertain what colour phenotypes are compatible with the genotype of the Vizsla and which are indicative of cross breeding. To take but one example, the "area of black in the coat" referred to as a serious fault in the American standard is extremely unlikely to occur on a recessive yellow dog.⁴ Black pigmentation of the nose leather, however, could occur but would have to be explained as resulting either from a mutation or from cross breeding to a $B-ee$ breed.⁵

The researching and writing of this article were prompted by my own curiosity about a significant aspect of the Vizsla and my desire to clarify the contradictory information in existing literature. I hope it can fill a void and serve to increase knowledge about our breed. The Vizsla's coat colour is part of what defines the breed. The Vizsla has been called the "golden dog" and anyone who has ever spied one standing proudly in the warm sunlight of a late summer

afternoon will know why. We can finally appreciate not only that gold glory but also understand the genetic interactions that produce it.

François-R. Bernier
Bajnok Reg'd Vizslas and GSPs
vizslas@bajnok.com

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⁴ *The only available explanation for such a marking would involve a somatic mutation in which one of the ee pair mutates to E at the same time as one of the bb pair mutates to B. That two mutations would occur in the same cell at the same time is unlikely but, of course, not impossible.*

⁵ *In a personal communication to the author, Dr. Bernard McGivern, who headed the breed standard committee at the time of the introduction of this disqualification, confirmed that while he had personally examined a Vizsla with black nose and black nails, he had never seen a Vizsla exhibiting an area of black in the coat. The "area of black in the coat" language was apparently taken from the German Shorthaired Pointer breed standard and added to the Vizsla standard in the mistaken belief that such a trait would be indicative of cross breeding. Those who approved this change clearly did not take into consideration the fact that the GSP is an EE breed while the Vizsla is an ee breed.*