Canary Culture: Concepts in Genetics

PART 4

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My last article dealt with sex-linked inheritance. We learned how the sex-linked characteristic can exhibit itself as dominant or recessive. Also, we learned which colors and/or mutations are sex-linked. I neglected to include the "Satinette" as one of the sex-linked mutations. Satinette factor has a great effect of diluting the melanin pigment, especially the black. Also, it has effects on the pigment in the eyes. Satinette, in appearance, is an Isabel with red eyes. Satinette factor is sex-linked recessive to all other factors. Satinette is not to be confused with the "Ino" canary whose eyes are also red. The Ino factor is autosomal recessive.

Autosomal Recessive (Linkage)

The canary mutations which exhibit autosomal recessive linkage are: Recessive White, Ino, Opal, and Lizard canary. Their genetic information is attached to the autosomal chromosomes, and no longer can we predict which sex will exhibit the factor.

To illustrate the results of autosomal recessive linkage, let us take a look at the Punet Square (figure 1).

COCK OR HEN	XN	XN
Xi	XN Xi	XN Xi
Xi	XN Xi	XN Xi

Figure 1

This practical example is the mating of a normal canary to an Ino canary. In this case, anything other than Ino is normal. Therefore, we could use any color in place of normal and results would be the same. Also note that when working with autosomal recessive linkage, it does not matter to which parent the information in question is attached to; the results are the same. The results in this mating are that all four offspring are phenotypically normal and genotypically carriers of Ino. Note that the sex is not obvious as it is in sex-linked inheritance. Here we must assume that 50%, or two offspring, are females and any of the four could be male or female. Also note: the female can be a carrier (heterozygote), in contrast to the sex-linked inheritance, where a hen is always a homozygote (pure in color or factor she inherited).

In dealing with autosomal recessive inheritance, we need only to designate the chromosome with the letter (see figure 2).

	N	N
i	N i	N i
i	Ni	Ni

Figure 2

Figure 2 shows the same mating as in figure 1. By omitting the "X"s we have simplified the schematic. In all the future matings we will use this same method.

Figure 3 shows the mating of a normal canary to an Ino carrier. The result is all the offspring are phenotypically normal in appearance, and two of them are genotypically carriers of Ino. The two carriers are not recognized visually. Therefore, all offspring must be tested by breeding them next year. Consequently, I consider this mating a waste of time, and it should be avoided.

	N	N
N	N N	N N
i	N i	N i

Figure 3

Figure 4 shows mating Ino to Ino which will result in all offspring being Inos. This mating is practical but not recommended. Mating recessive to recessive results in smaller and weaker offspring. When working with autosomal recessive, a more desirable mating would be Ino (homozygote) to a normal carrier of Ino (heterozygote).

	i	i
i	i i	i i
i	i i	i i

Figure 4

Figure 5 shows an example of such a mating, giving the results of two Inos and two carriers of Ino. Keep in mind that these are all Mendelian ratios, and the results could be all Inos or all carriers.

Autosomal recessive linkage is sometimes referred to as "Homozygous Recessive." The reason for such terminology is when the autosomal recessive canary exhibits its characteristic phenotypically, it is a Homozygote.

	i	i
N	N i	N i
i	i i	i i

Figure 5

Autosomal Dominant Linkage

The only canary mutations which exhibit the autosomal dominant linkage are "Dominant White" and "Crested Canary." Dominant white and crested canary can be a heterozygote and exhibit its respective phenotype. Figure 6 shows an example of the mating of a white homozygote to a yellow homozygote. The result is all offspring are white heterozygotes.

	W	W
y	W y	W y
y	W y	W y

Figure 6

Until recent times, fanciers were told not to mate a dominant white to a dominant white, the reason being it will produce dead offspring. The theory was that homozygous white is not viable. This theory was disproven by several European breeders. Figure 7 shows an example of a dominant white (heterozygote) mated to a dominant

white (heterozygote), which will produce white (homozygote), yellow, and white (heterozygote).

	W	Y
W	W W	W y
y	W y	y y

Figure 7

The white (heterozygote) offspring will be recognized by having a small amount of yellow suffusion on their wings. The white (homozygote) will be pure white, and a definite proof of a viable dominant white homozygote.

Crested Canary

To produce a good crest, the best mating is crested canary to a plain head. My experience is mating crest to crest will produce some deformed crests and/or bald-headed canaries. My theory is the bald-headed offspring are homozygotes which receive double crest factor. Figure 8 shows this mating. One offspring, "CC," received double crest factor.

	C	p
C	C C	C p
p	C p	p p

Figure 8

The accepted theory by a majority of canary breeders is that double crest factor is not viable. At any rate, mating crest to crest does not produce attractive canaries, and crest to plain head mating should be used, as in Figure 9. The results are 50% crested and 50% plain head.

	C	p
p	C p	p p
p	C p	p p

Figure 9

Note that the plain head is always a homozygote, and mating a plain head to a plain head will never produce a crest.

This concludes Part 4 of this article. ●