SEXING DOVES III. SEX-LINKED GENETIC CHARACTERS

by

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The only easy way to sex young doves is with sex-linked colors, but not every mating is suitable. The sex-linked genetic characters known in ring-neck doves, Streptopelia risoria, are the oldest color variations: blond (=fawn=dilute) and white (extreme dilute) in which the near half of the under side of the major tail feathers is slightly pigmented. Genetically, blond is a recessive mutant to the normal wild type dark. White is recessive to both normal and blond. The colors were noted by C. O. Whitman in a 1919 publication by the Carnegie Institution of Washington. We'll ignore other colors for present purposes.

By sex-linked we mean the controlling gene is on the sex chromosome called Z in birds. Male birds have two Z chromosomes and females have one Z alone or a Z and one called W depending on the species. Not much is known in birds about these chromosomes. Only recently have the chickens and pigeons been shown to have the Z-W set up. For our purposes the W is inert, if it is present at all in doves.

Those genetically trained can tag the Z symbol with the wild type (D^+) or blond (d^B) or white (d^W) gene symbols and manipulate the expected outcome on paper. Others can develop a rule of thumb or refer to the following kind of results in the tables below.

Since males have two (sex-linked) color genes and the females only one, the males can have a dominant gene hide or obscure effects of the presence of a recessive one. Thus, a dark male can carry (heterozygous) a gene for blond (D^+d^B), or it can carry a gene for white (D^+d^W). A blond male can carry a gene for white (d^Bd^W). Or the males may be pure (homozygous), D^+D^+, d^Bd^B, or d^Wd^W, for the color they show. But females have only one (sex-linked) color gene (hemizygous) and show whatever they carry: D^+, d^B, or d^W. Alternative forms of genes are called alleles and this represents a multiple allelic sex-linked series described by L. J. Cole in 1930 (Anat. Rec. 47:389).

If one selects the parents as a lighter colored male with a darker colored female, then the offspring's sex can be inferred with complete accuracy as the reverse (!): darker offspring are males and lighter ones are females. This is understandably called criss-cross inheritance. The males contribute one of their two genes (equal random chance which) to all offspring; females contribute their one gene or nothing (equal random chance which) to all offspring.

Specific examples are best. A white male mated with a blond female yields white daughters and blond sons (which carry white). See mating type 1 in the table.

Table I. Sex-linked colors in ringneck doves in mating combinations which allow the sex of some or all the offspring to be inferred by color. Genotypes.

Mating type	Parents ♂	x	Parents ♀	Offspring ♀	Offspring ♂
1	$d^W d^W$	x	d^B	d^W	$d^B d^W$
2	$d^W d^W$	x	D^+	d^W	$D^+ d^W$
3	$d^B d^B$	x	D^+	d^B	$D^+ d^B$
4	$d^B d^W$	x	D^+	¼* d^B, ¼ d^W;	¼ $D^+ d^B$ ¼ $D^+ d^W$
5	$d^B d^W$	x	d^B	d^B d^W;	$d^B d^B$ $d^B d^W$
6	$D^+ d^W$	x	d^B	D^+ d^W;	$D^+ d^B$ $d^B d^W$
7	$D^+ d^W$	x	D^+	D^+ d^W;	$D^+ D^+$ $D^+ d^W$
8	$D^+ d^B$	x	D^+	D^+ d^B;	$D^+ D^+$ $D^+ d^B$

*¼ of the offspring, or half of that sex. This frequency occurs in mating types 4, 5, 6, 7, and 8.

Table II. Sex-linked colors in ringneck doves in mating combinations which allow the sex of some or all the offspring to be inferred by color. Phenotypes.

Mating type	Parents Male	x	Parents Female	Offspring Female	Offspring Male	(Male carries)
1	white		blond	white	blond	(white)
2	white		dark	white	dark	(white)
3	blond		dark	blond	dark	(blond)
4	blond(white)		dark	½ blond ½ white	dark	(blond or white)
5	blond(white)		blond	½ blond ½ white	blond	(½ the sons carry white)
6	dark(white)		blond	½ dark ½ white	½ dark ½ blond	(blond) (white)
7	dark(white)		dark	½ dark ½ white	dark	(½ the sons carry white)

The first four mating types allow the sex of all the offspring to be inferred from their color. The last four mating types allow half the daughters (¼ the progeny) to be distinguished as females. Mating type #6 also allows half the sons to be distinguished.

The fourth type of mating yields two kinds of daughters, blond or white, in equal frequency (since the father is heterozygous); but only one kind of son occurs, dark, in the way they look; but such sons are two kinds genetically, one carrying blond and one carrying white.

Some matings types (5-8) allow the sex of some of the offspring to be inferred by their color. For example, in #5 blond progeny may be either female or male, but all white progeny are female.

One does not have to wait for plumage to develop in the squab. Immediately after hatching the bill ring, eye and skin color allow the sex to be recorded. A heavy dark bill ring and dark skin is a dark (wild type) squab. A less dark (brown) bill ring is a blond squab. Lack of a bill ring, pinkish eyes and sparse down is a white squab. The results are the same in species crosses where the wild species is considered "dark".

It's easy -- after you get enough practice!

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