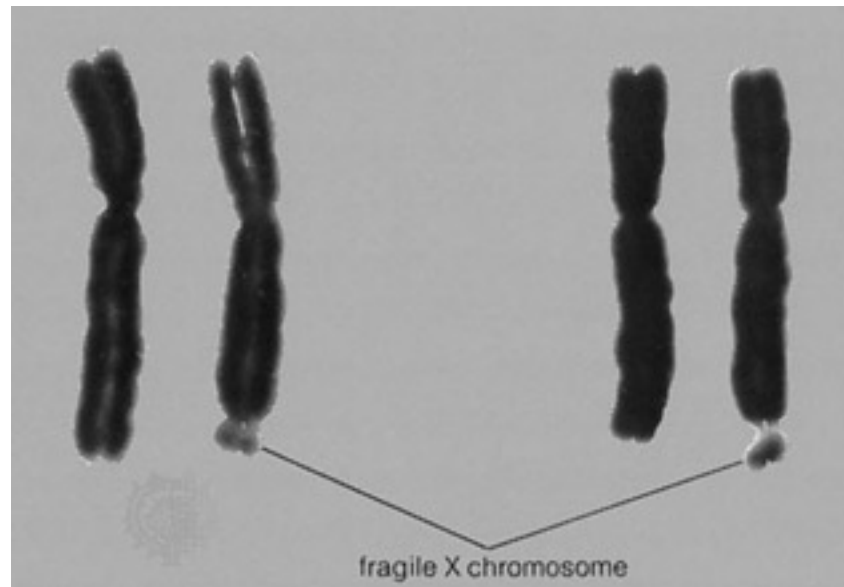
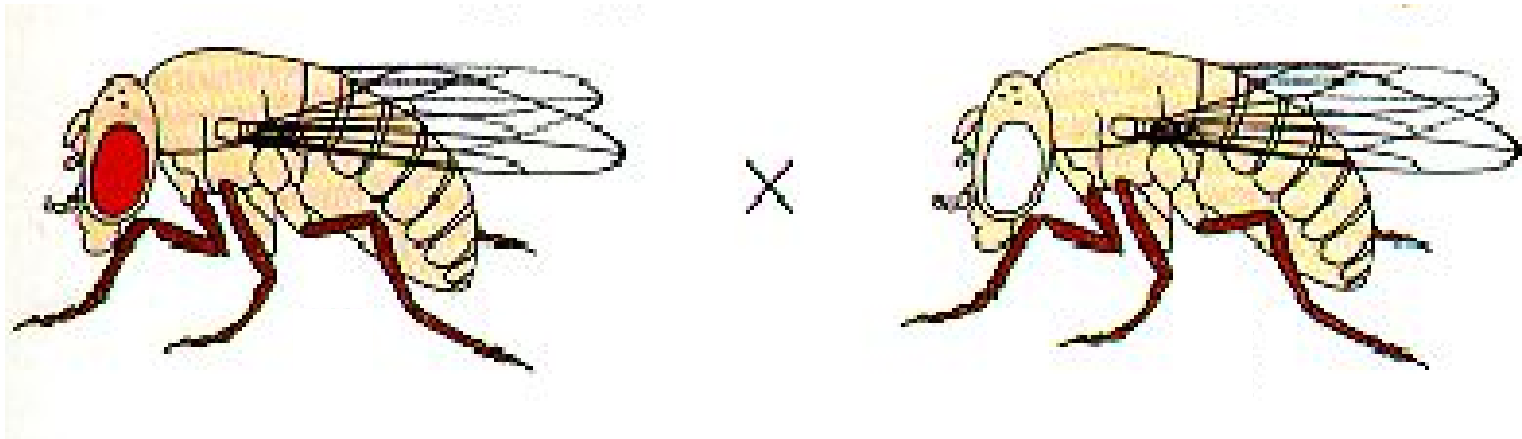


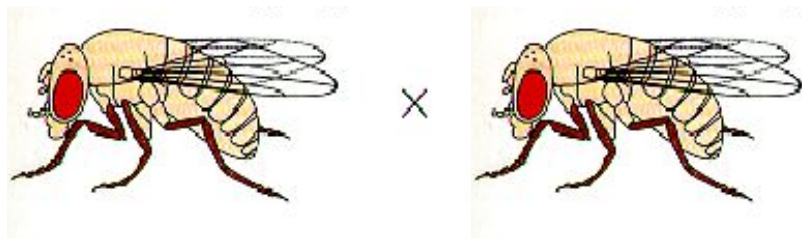
Sex linked



Morgan (1866-1945)
Drosophila (fruit fly)

[red eyes dominant, white recessive]





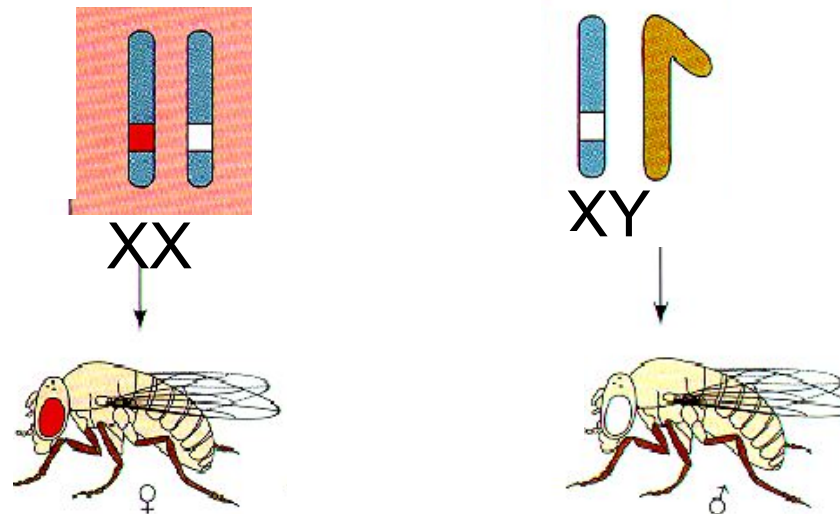
- crossed heterozygous red eyes

---> observed that all white-eyed flies were **male**



WHY??

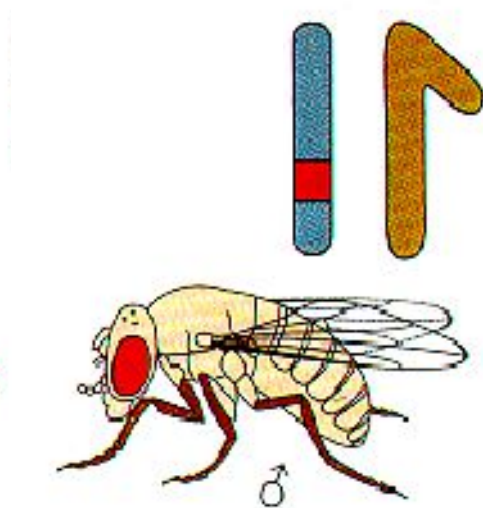
- he reasoned that the eye colour genes were found on the sex chromosomes



X Linked Genes

What is the genotype of a male that has red eyes?

Red dominant= X^R
White recessive= X^r

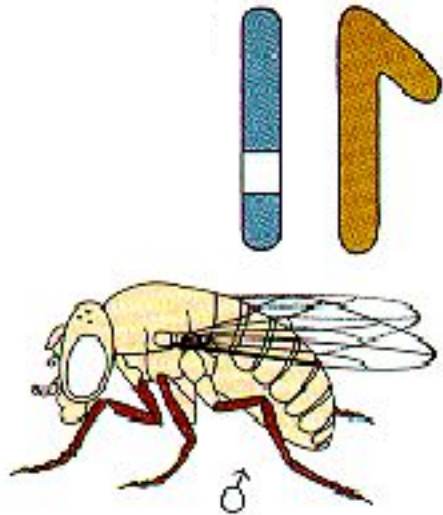


= $X^R Y$

X Linked Genes

White eyed male?

Red dominant= X^R
White recessive= X^r



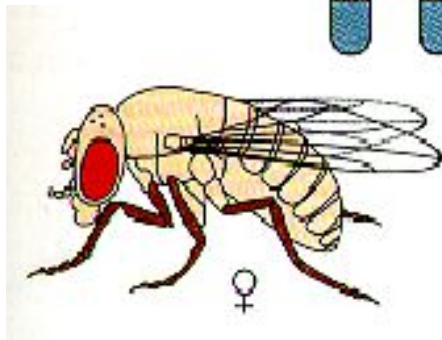
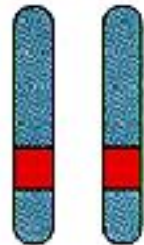
= $X^r Y$

X Linked Genes

Red eyed female?

Red dominant= X^R
White recessive= X^r

Homozygous



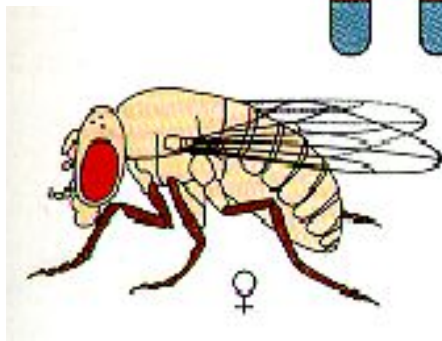
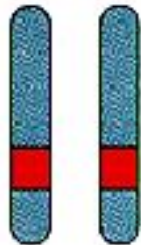
$$= X^R X^R$$

X Linked Genes

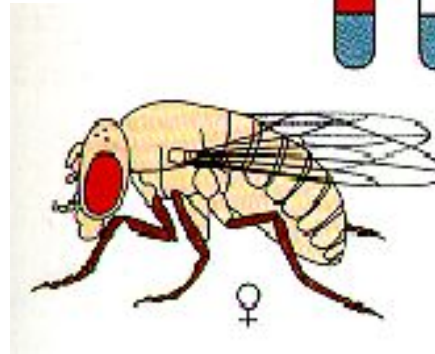
Red eyed female?

Red dominant= X^R
White recessive= X^r

Homozygous



Heterozygous



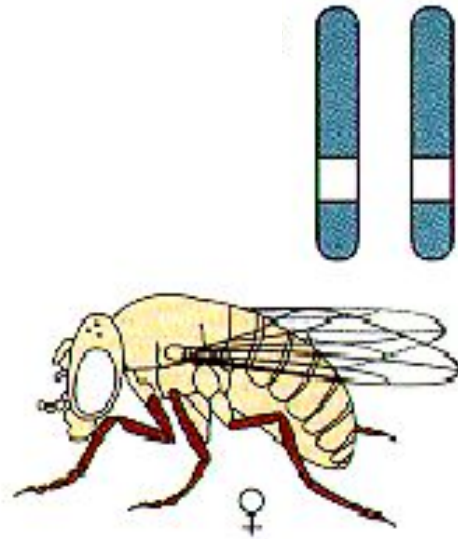
$$= X^R X^R$$

$$= X^R X^r$$

X Linked Genes

White eyed female?

Red dominant= X^R
White recessive= X^r

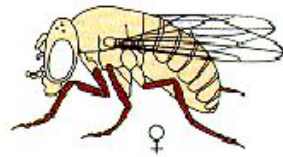


= X^rX^r

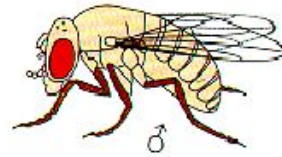
Lets cross a white-eyed female with a red-eyed male.

What is the phenotypes of the offspring?

X^rX^r

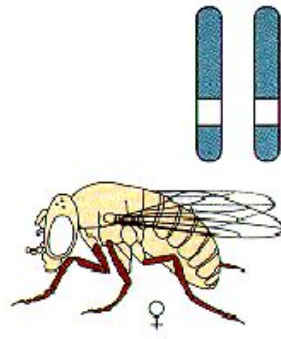


x

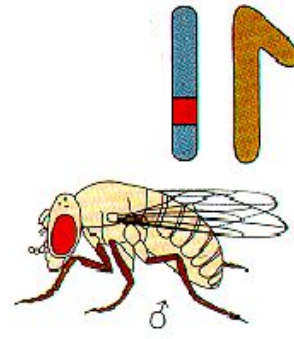


X^RY

X^rX^r

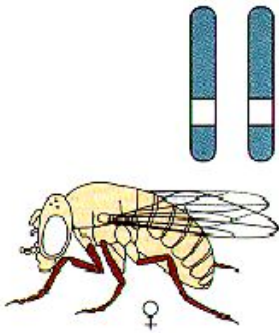


x

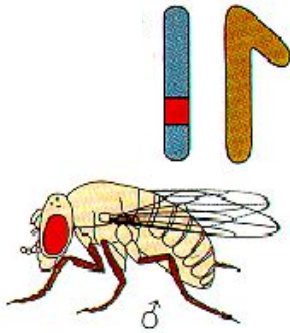


X^RY

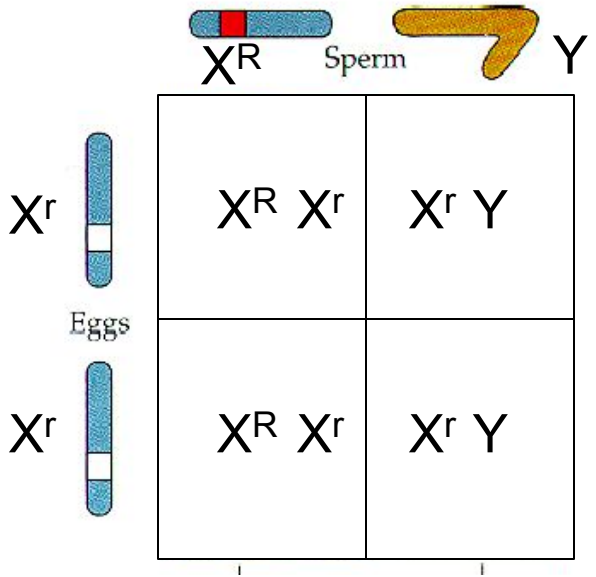
$X^r X^r$



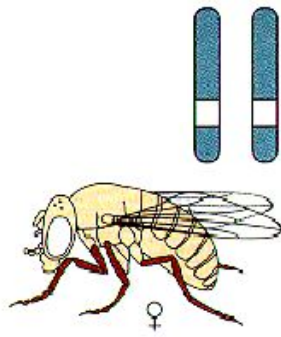
x



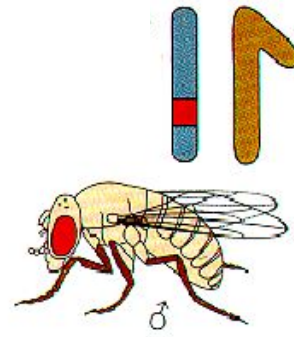
$X^R Y$



X^rX^r





x

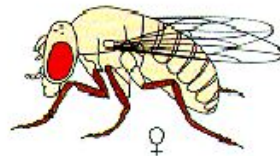


X^RY

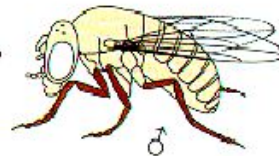


| | | |
|---|-----------|---------|
| X^r  | $X^R X^r$ | $X^r Y$ |
| Eggs | | |
| X^r  | $X^R X^r$ | $X^r Y$ |

X^RX^r



All daughters are red-eyed heterozygotes



All sons are white-eyed hemizygotes

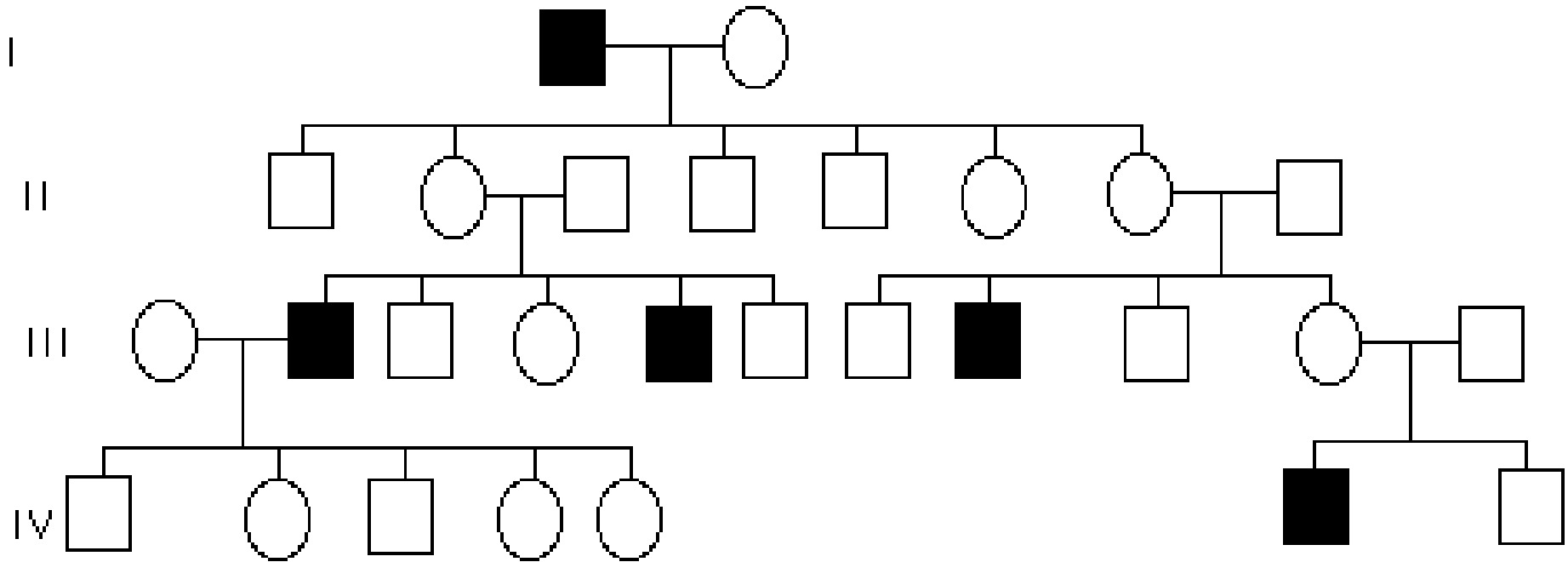
X^rY

Sex-Linked Inheritance

- occurs when genes are located on the sex chromosomes

(All the traits we have studied were located on the other autosomal chromosomes.)

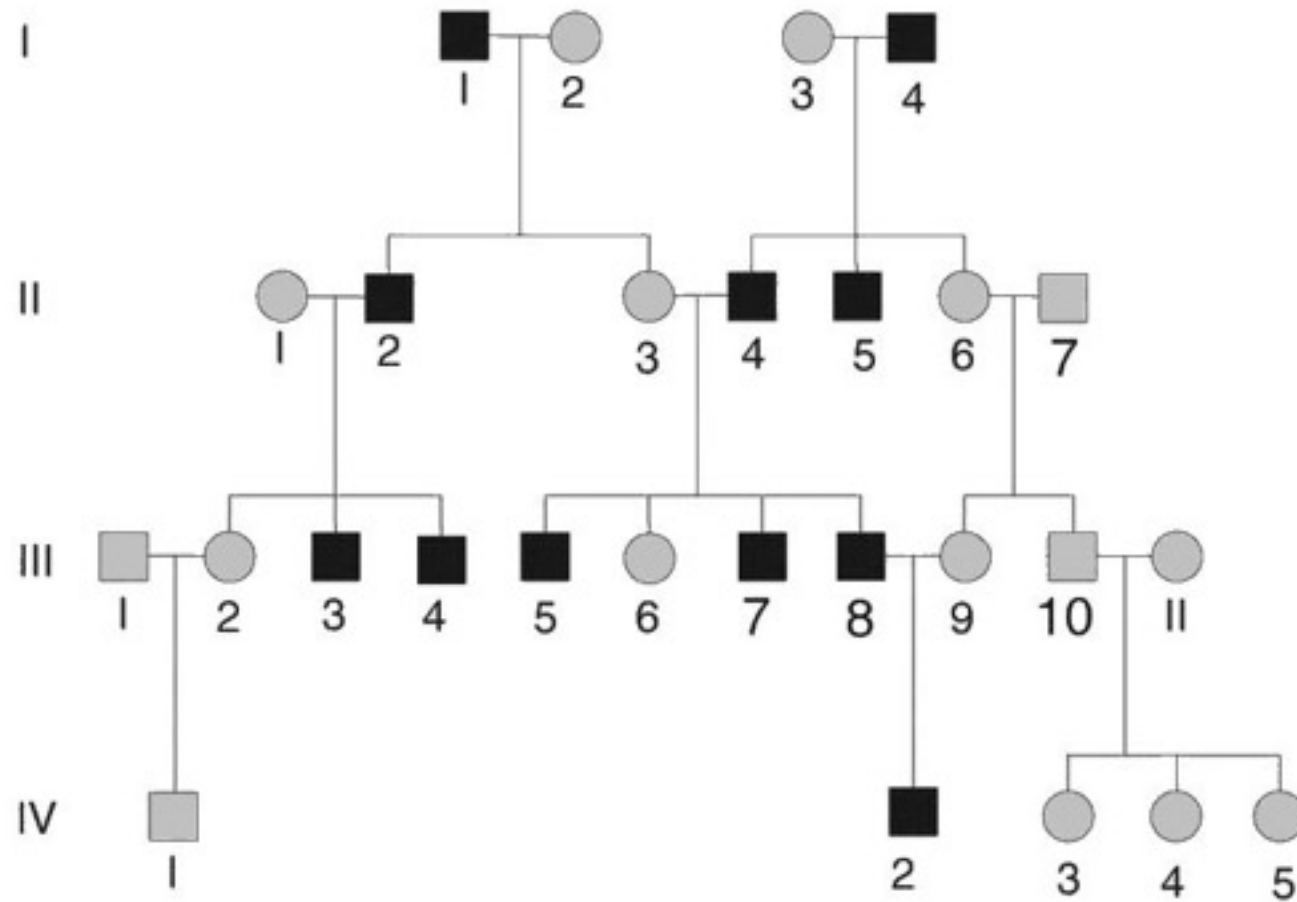
Sex-Linked Inheritance



X-linked- mostly males + skips generations

Y- linked- All males have it

Y-linked trait



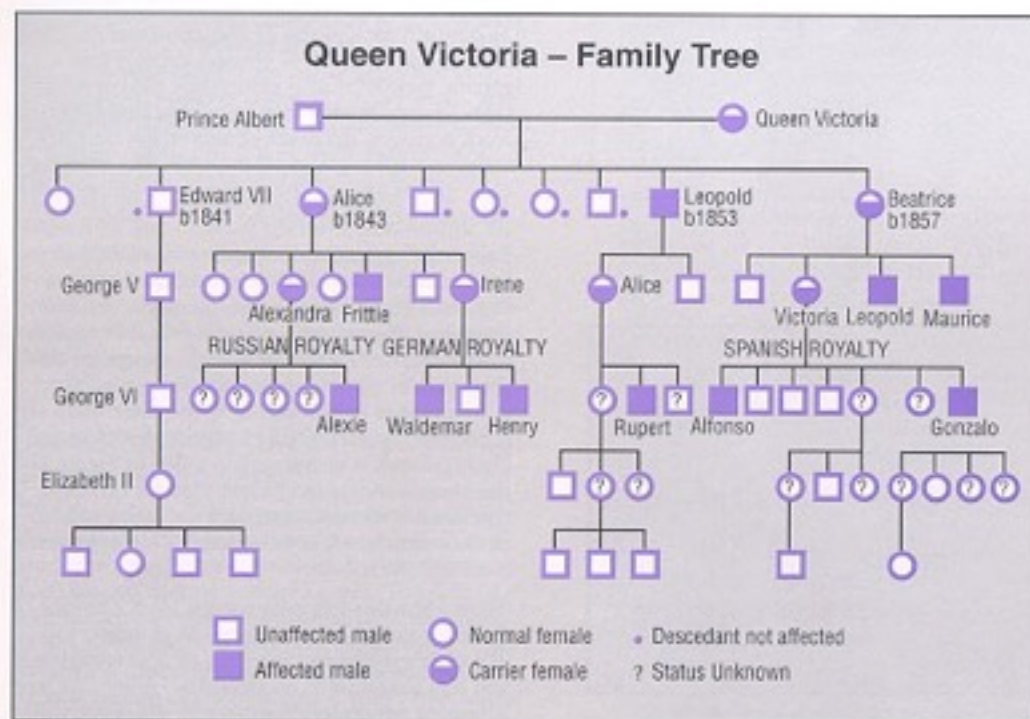


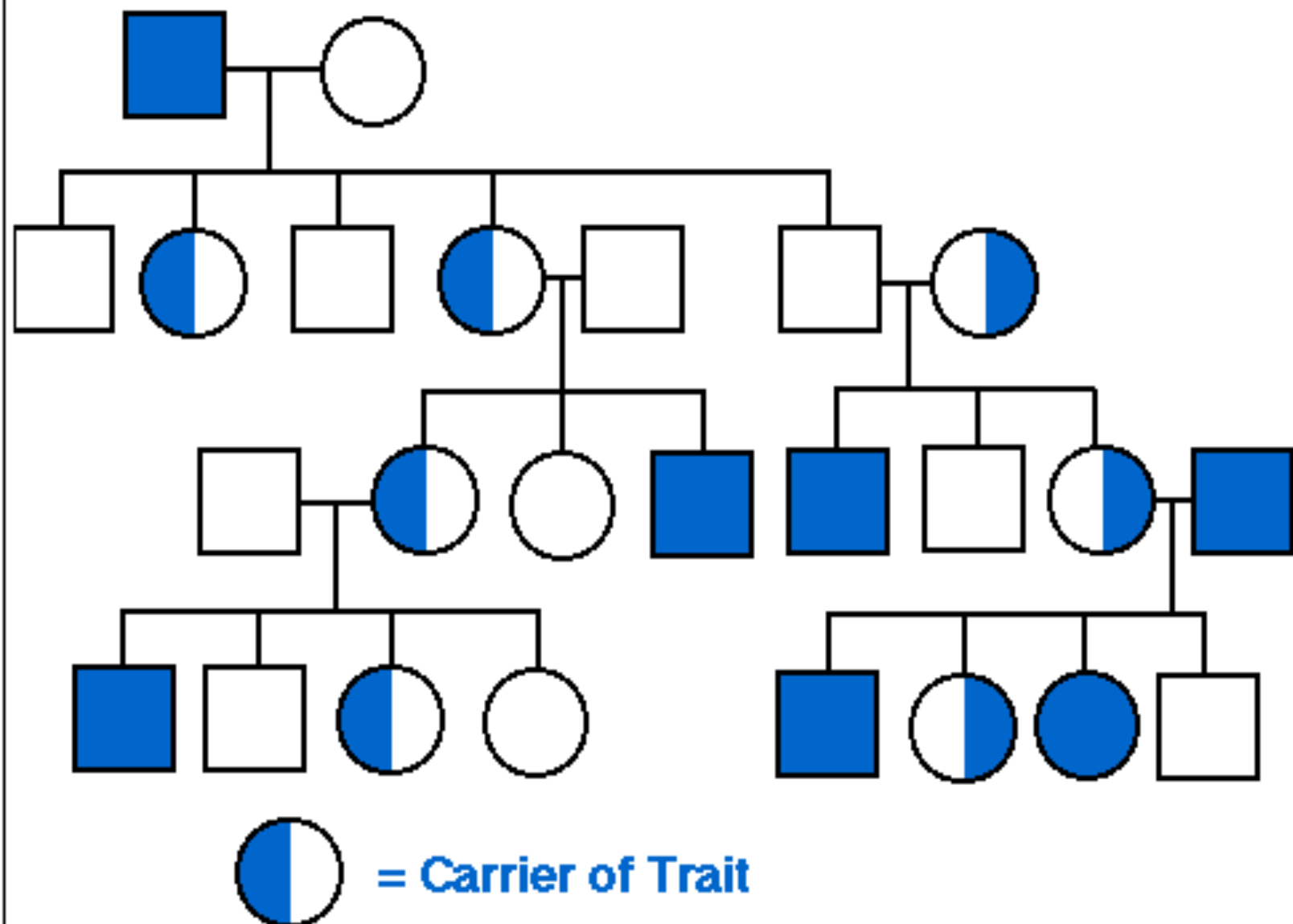
Figure 1. Queen Victoria's family tree.

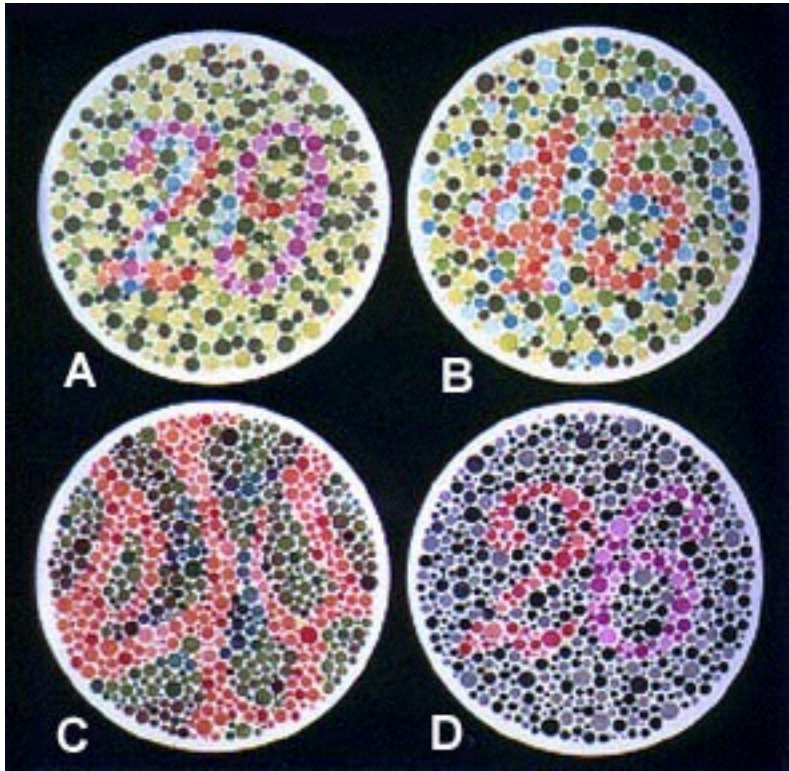
Sex-Linked Inheritance

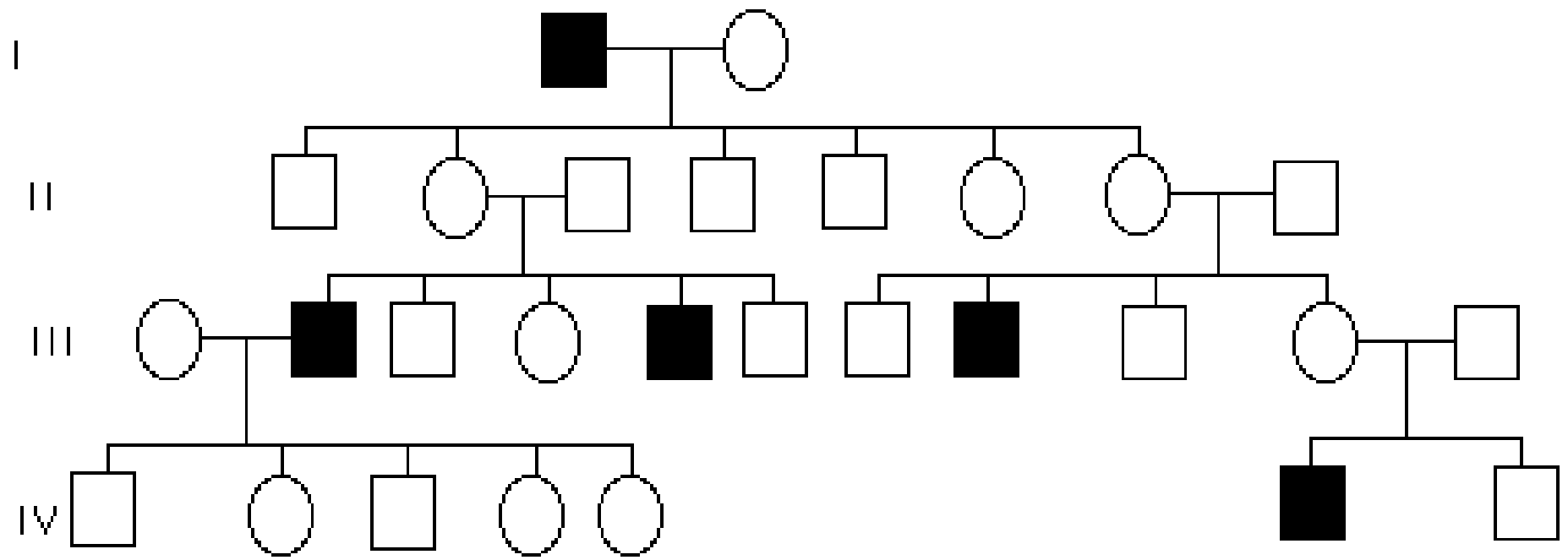
X-linked - genes located on the X chromosome
(many)

Y-linked - genes located on the Y chromosome
(few)

Inheritance of Red-Green Color Blindness: an X-linked Recessive Trait

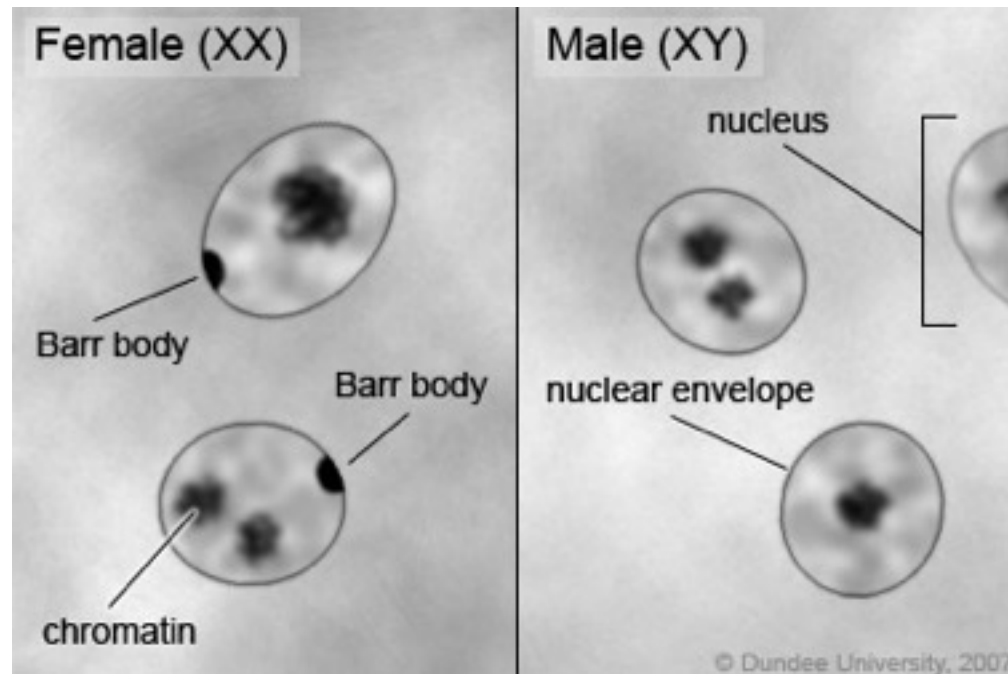






Barr Bodies

- discovered that **one** of the X-chromosomes becomes inactive in girls
- inactive X-chromosomes are called a **Barr Body**
- Inactivation occurs during embryo development

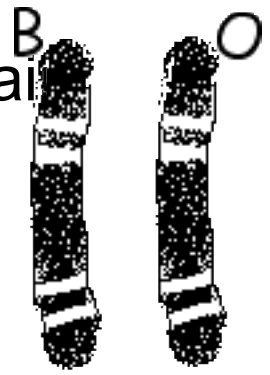


Why important???

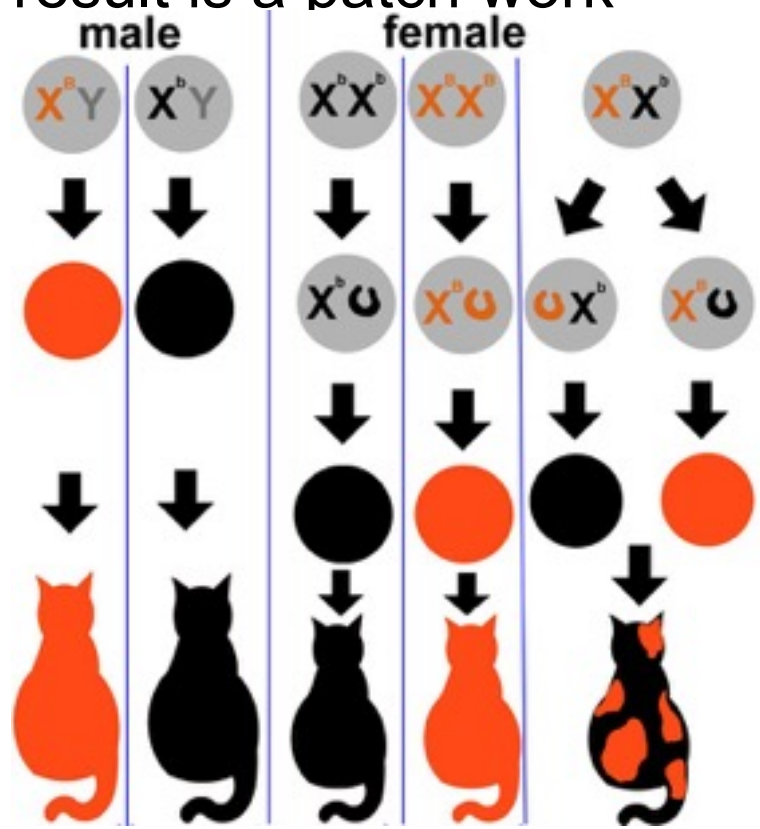
- in heterozygous females, some cells may express a certain trait while other cells may express a different trait



Eg. calico cats can only be female! Orange and black hair colour is found on the X- chromosome.



One X^O expresses the orange hair trait, while the other X^B express the black hair trait. The result is a patch work of hair.



The allele for orange is (X^O) while the allele for black is (X^B). What is the expected outcome of a male black cat with a female calico?