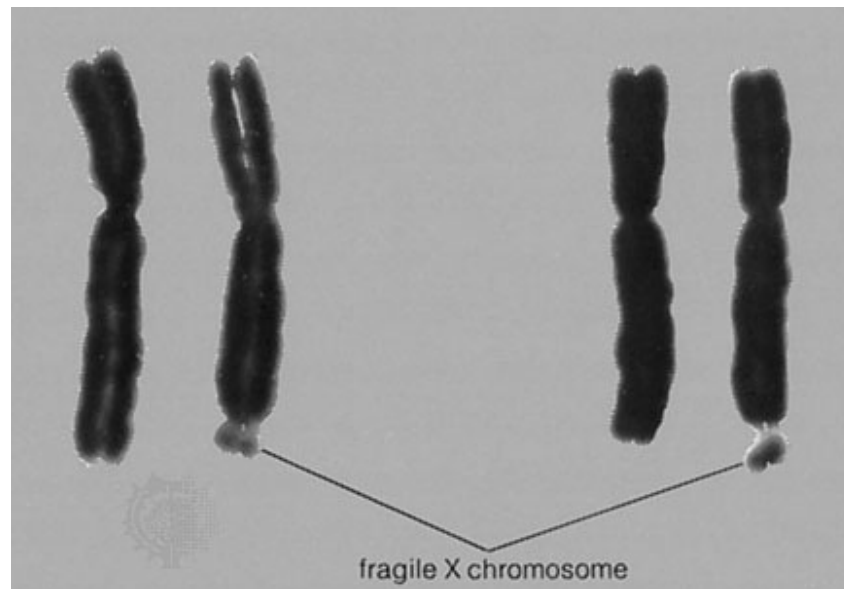
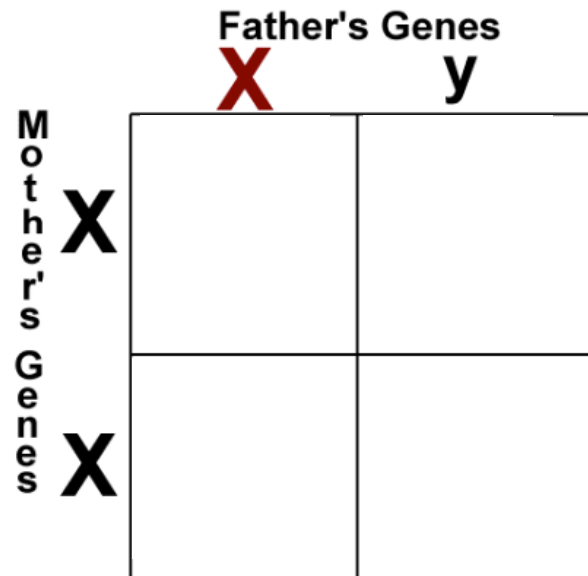


Sex linked

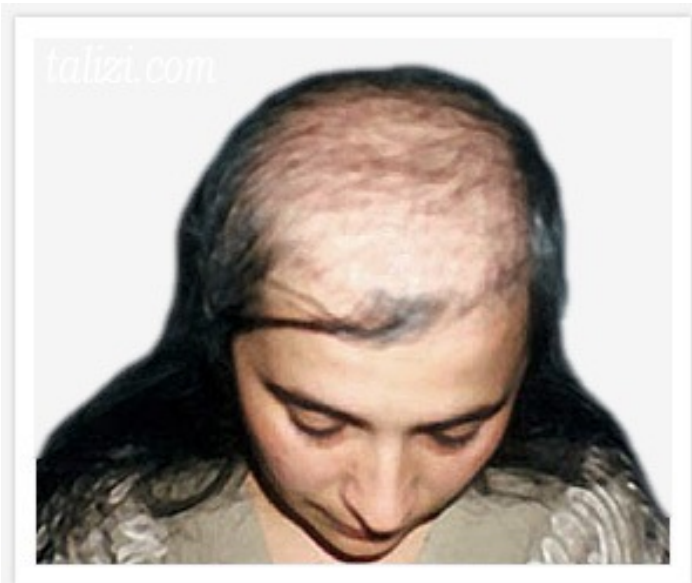


How is a baby's sex determined?











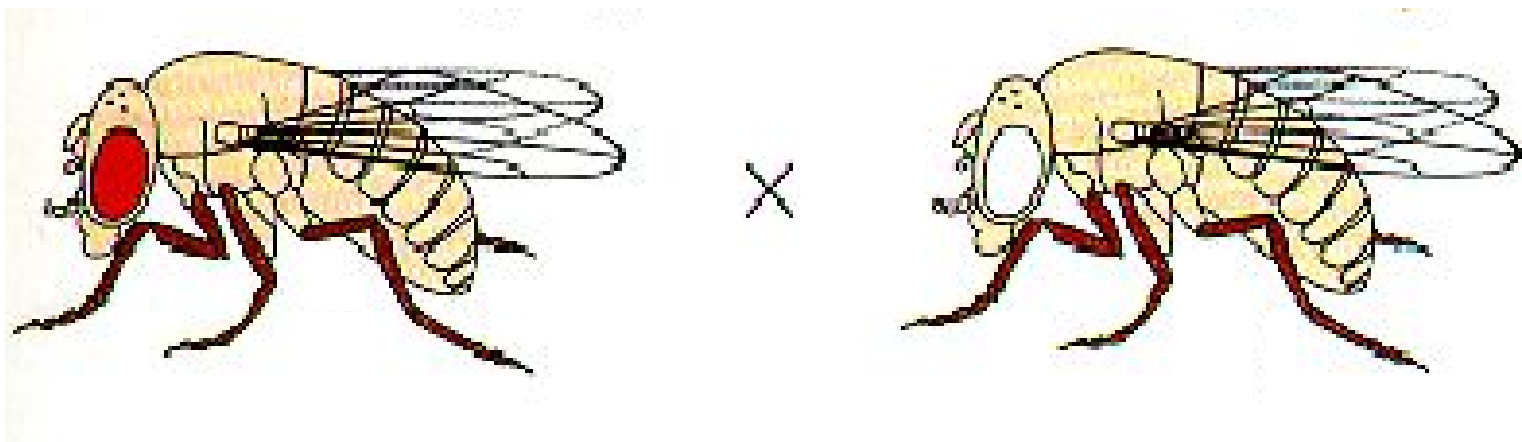
Successful Mating:

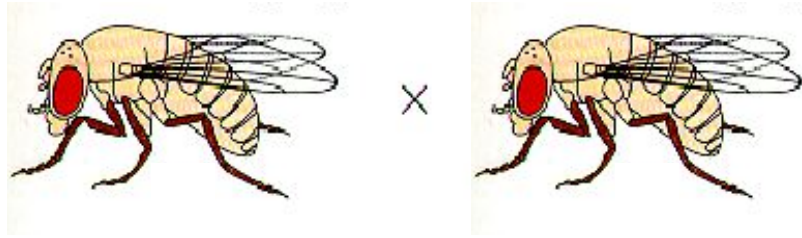
A male fly courts a
virgin female fly and
successfully copulates.



Morgan (1866-1945)
Drosophila (fruit fly)

[red eyes dominant, white recessive]





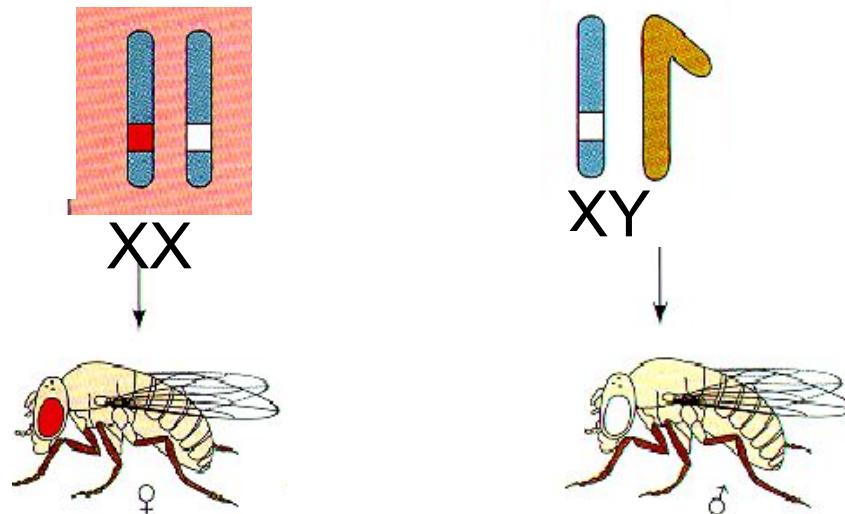
- crossed heterozygous red eyes

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



WHY??

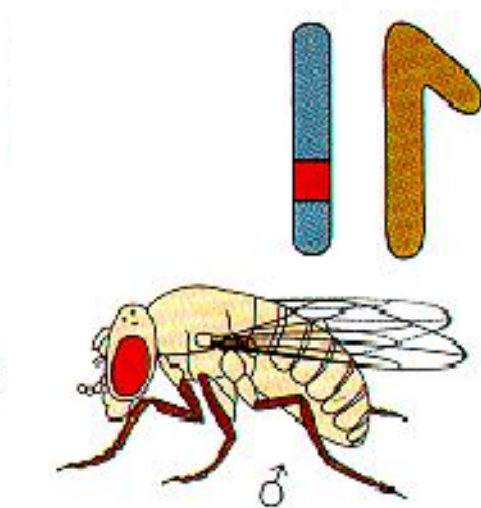
- he reasoned that the eye colour genes were found on the sex chromosomes



X Linked Genes

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

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

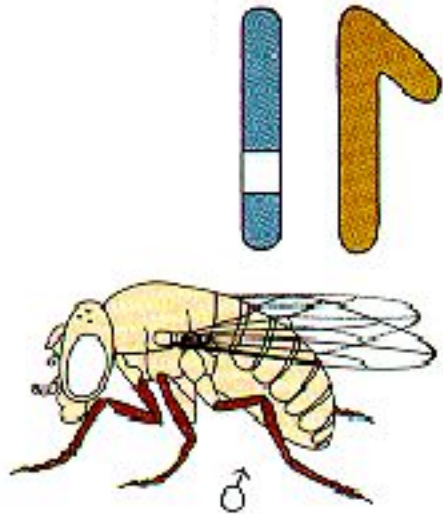


= $X^R Y$

X Linked Genes

White eyed male?

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



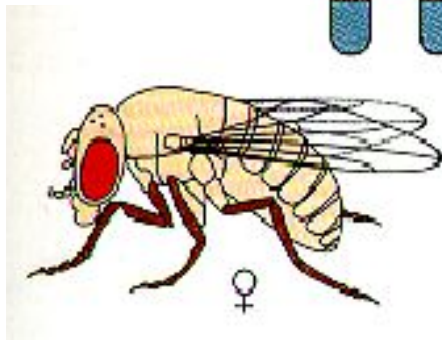
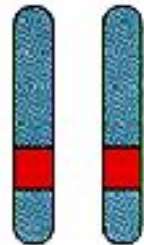
= $X^r Y$

X Linked Genes

Red eyed female?

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

Homozygous



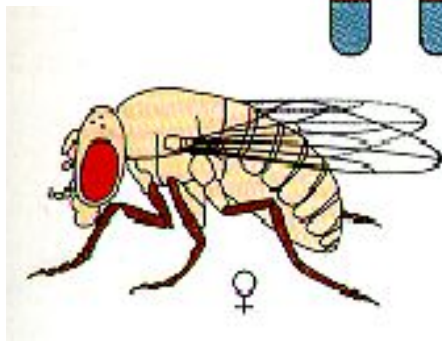
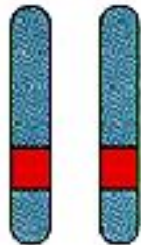
$$= X^R X^R$$

X Linked Genes

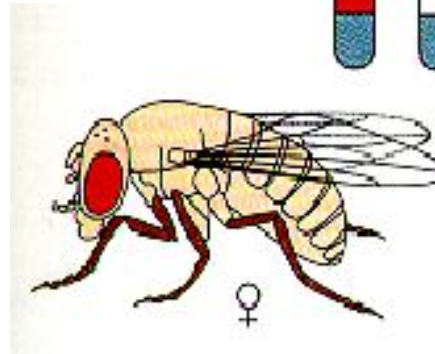
Red eyed female?

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

Homozygous



Heterozygous



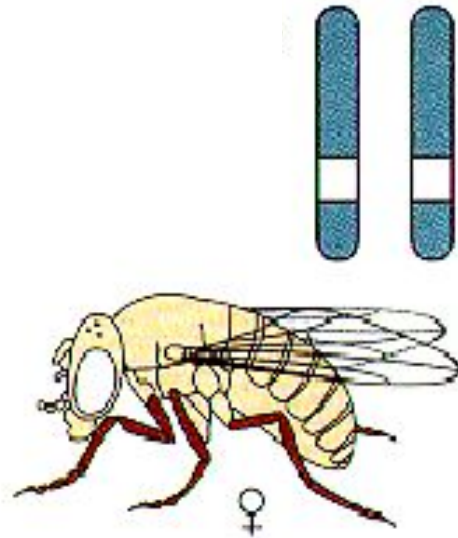
= $X^R X^R$

= $X^R X^r$

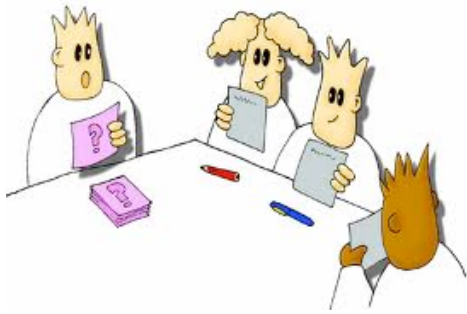
X Linked Genes

White eyed female?

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



= X^rX^r



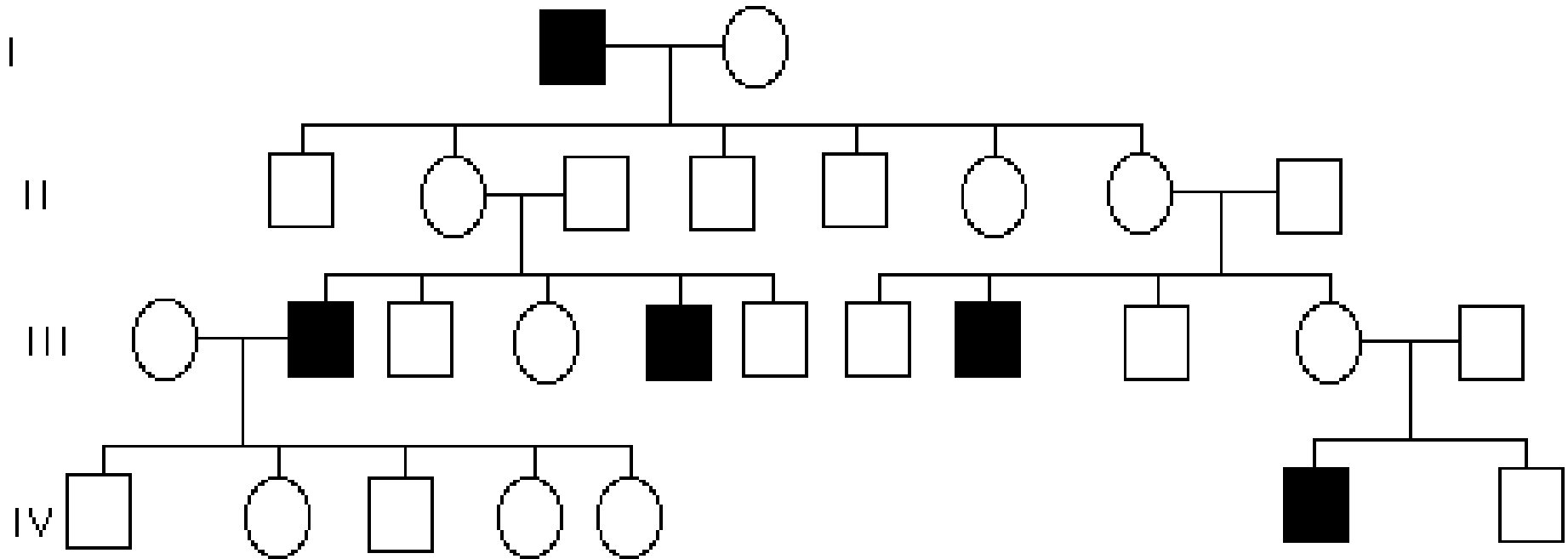
If a female fruit fly heterozygous for red eyes is crossed with a male that has red eyes, what eye colour with their offspring have?

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

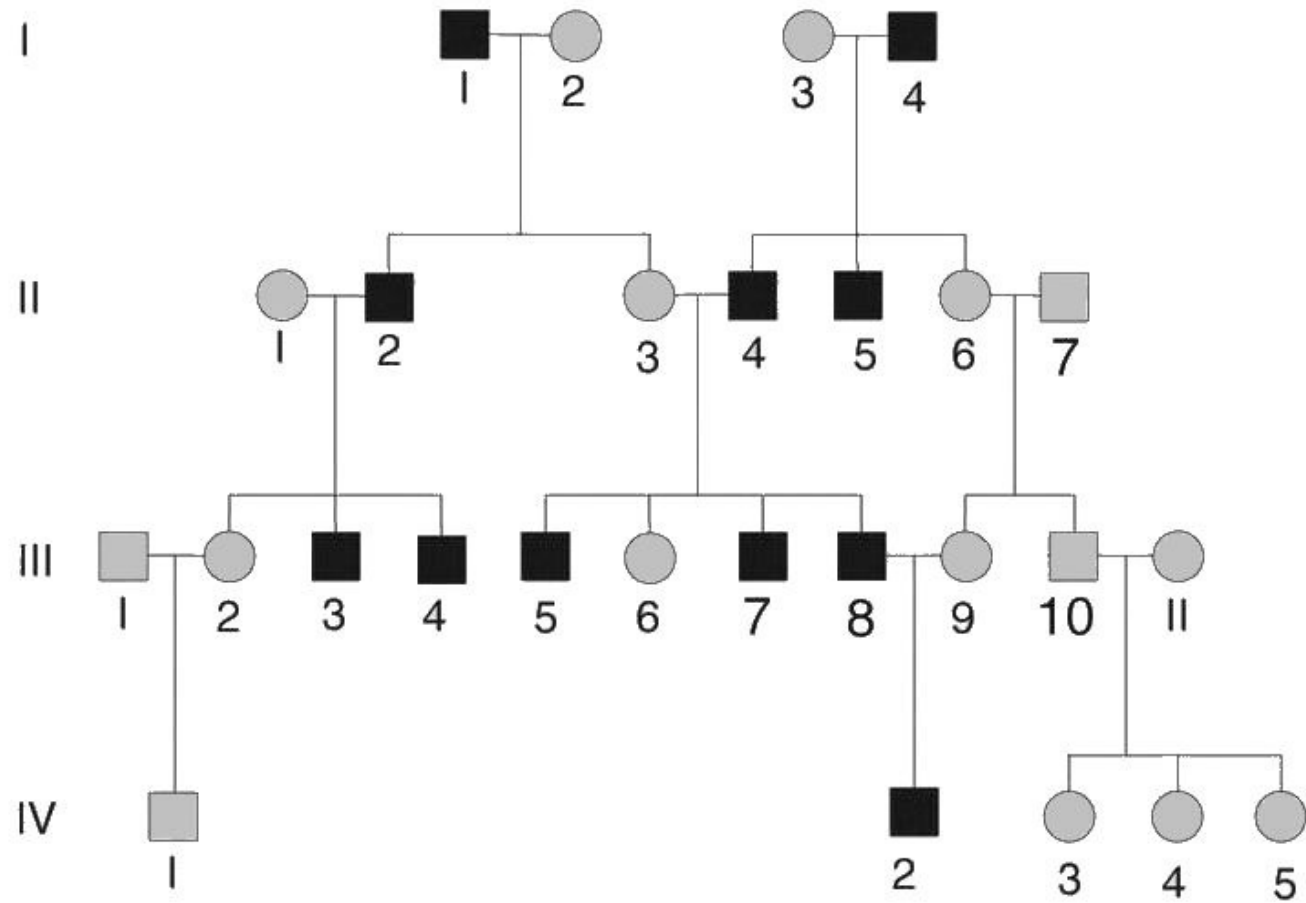
Sex-Linked Inheritance

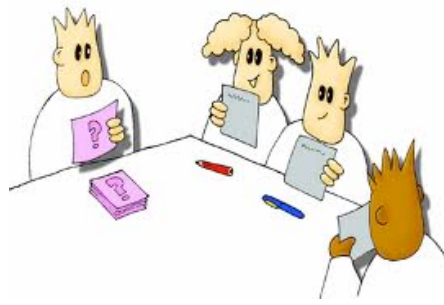
X-linked - genes located on the X chromosome
(many)

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



Y-linked trait





Hemophilia is recessive and carried on the X chromosome.

What offspring are possible of a man who is coloured blind and a woman who is a carrier?

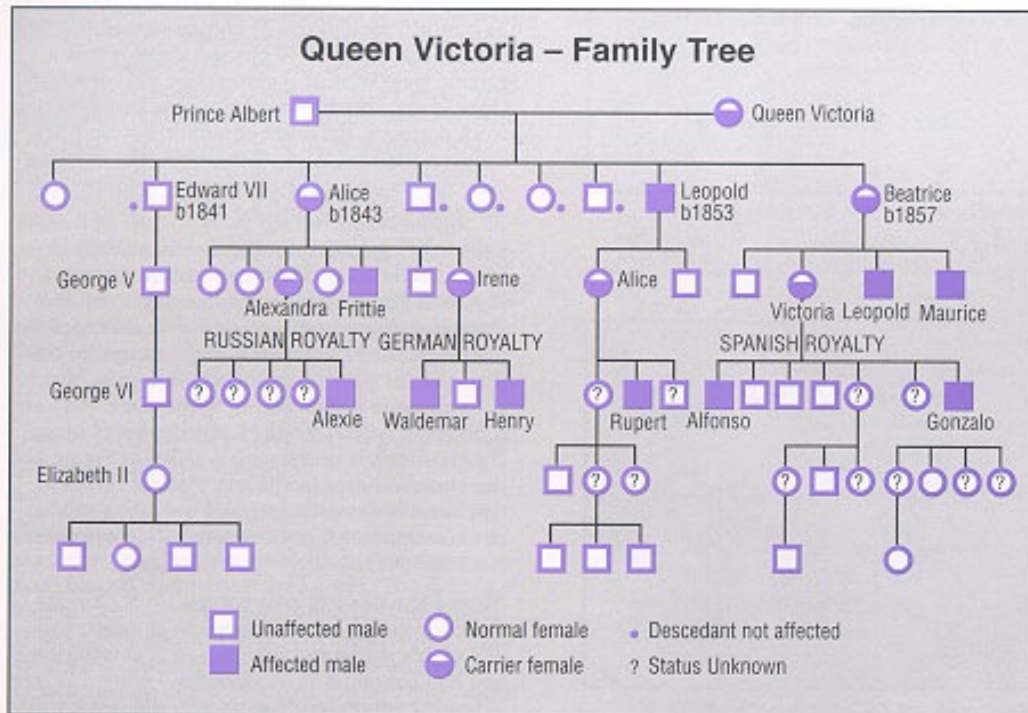
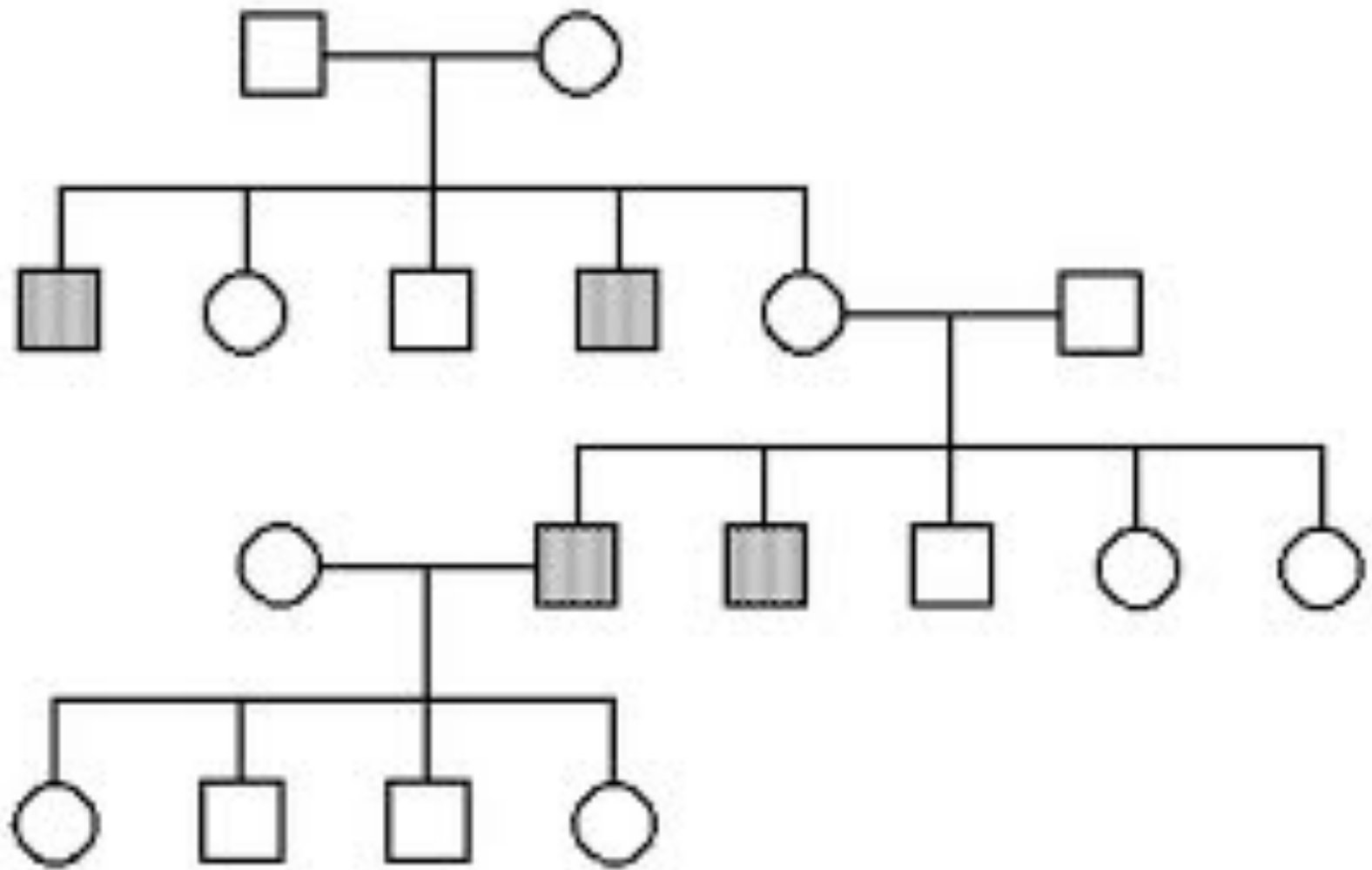
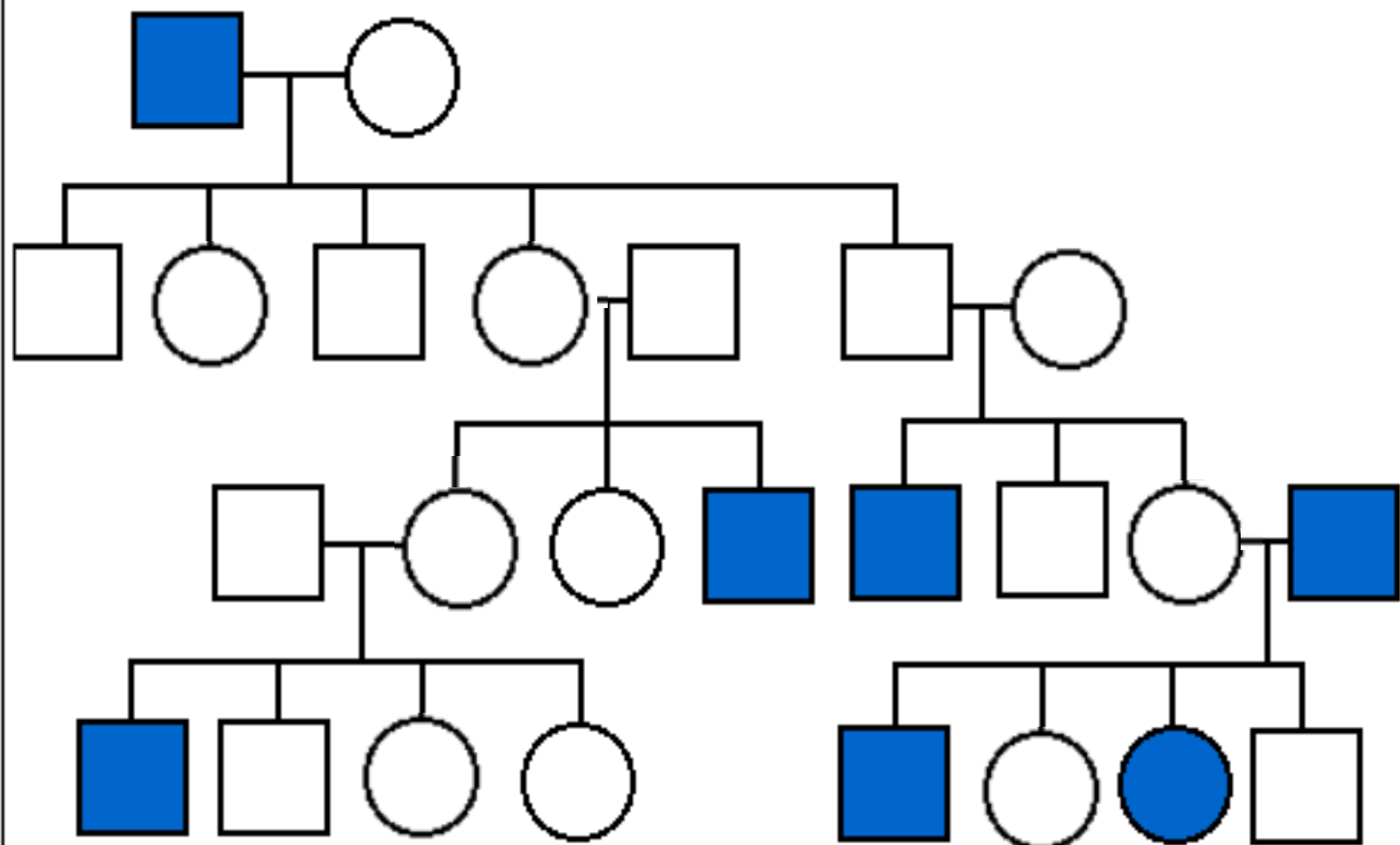


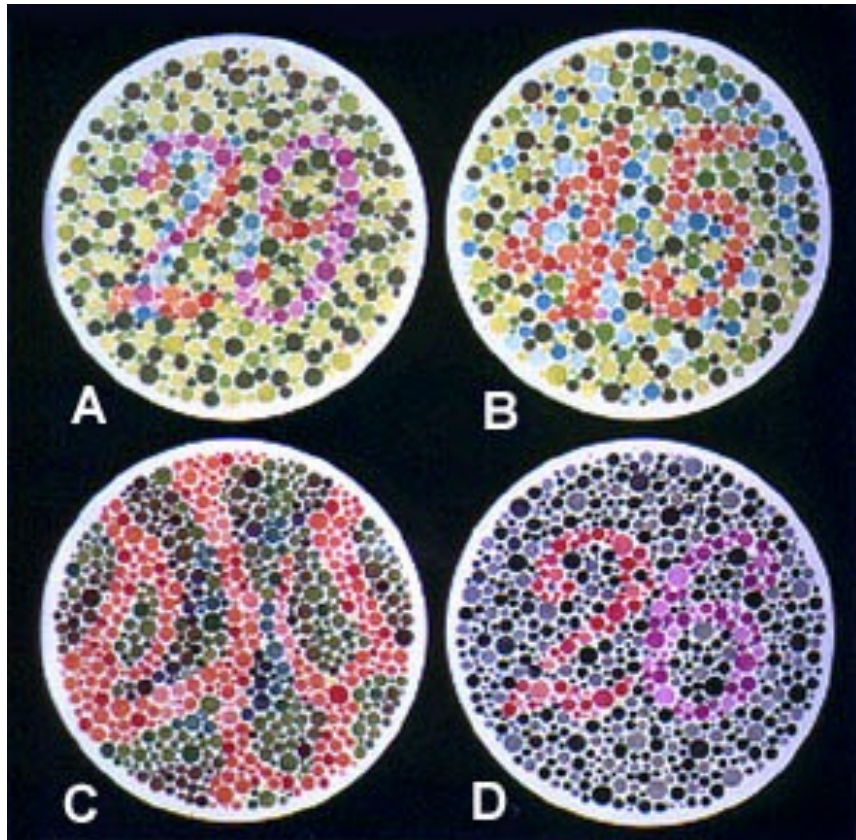
Figure 1. Queen Victoria's family tree.

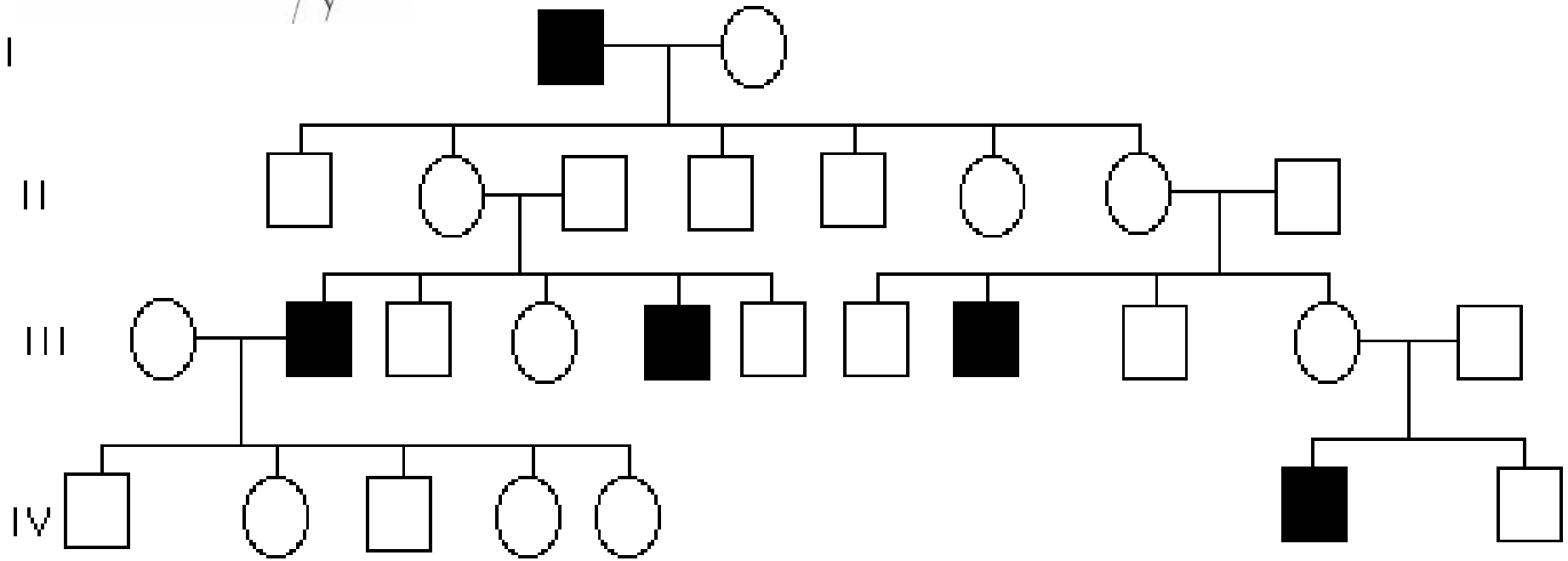
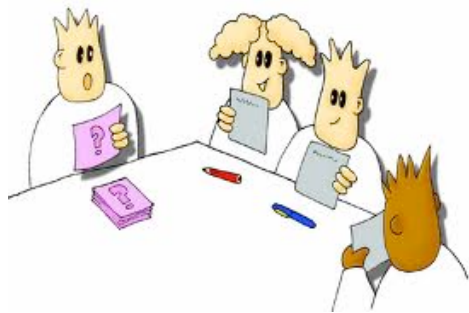
Pedigree Chart for Male Pattern Baldness



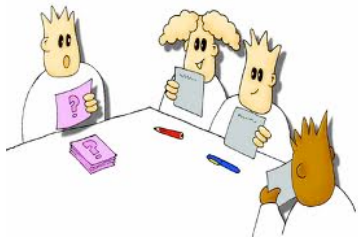
Inheritance of Red-Green Color Blindness: an X-linked Recessive Trait







- Is the trait x or y linked
- Determine the genotypes of these individuals

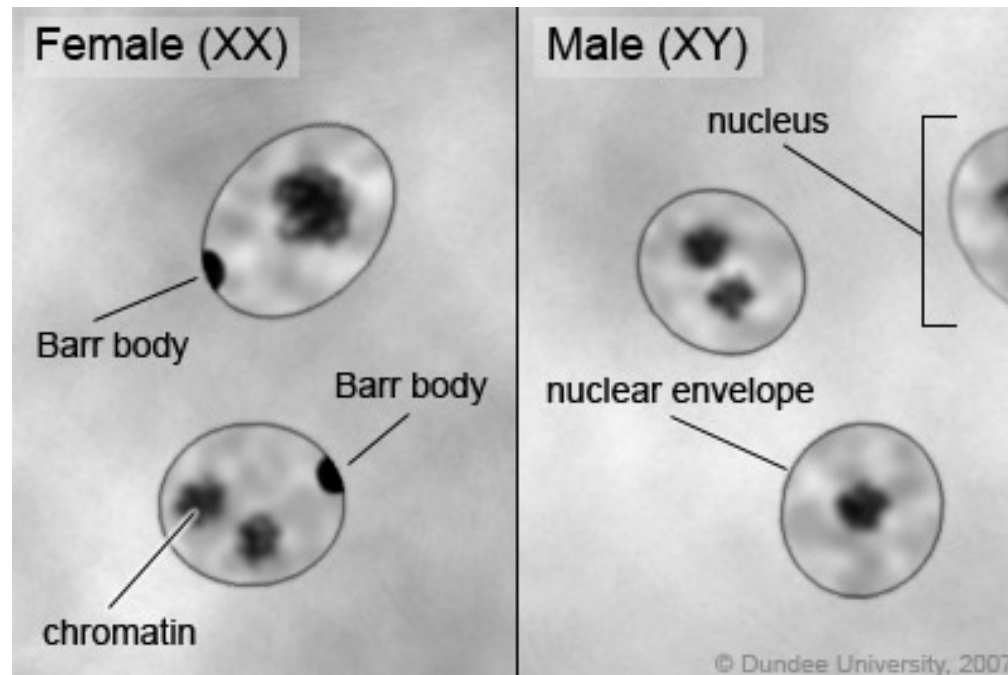


As a result of a mutation, the allele for hemophilia type B is believed to have been present in Queen Victoria. Hemophilia B is a sex-linked trait that affects males more often than females. Leopold, Duke of Albany, one of Victoria's children, was a hemophiliac. He had two children, one male and one female.

- a) the probability that Leopold's brother, Edward, was also a hemophiliac.
- b) the probability that Leopold's son was a hemophiliac.
- c) the probability that Leopold's daughter was a carrier of hemophilia.

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



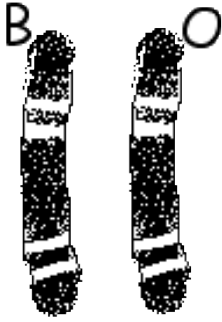
Why important???

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

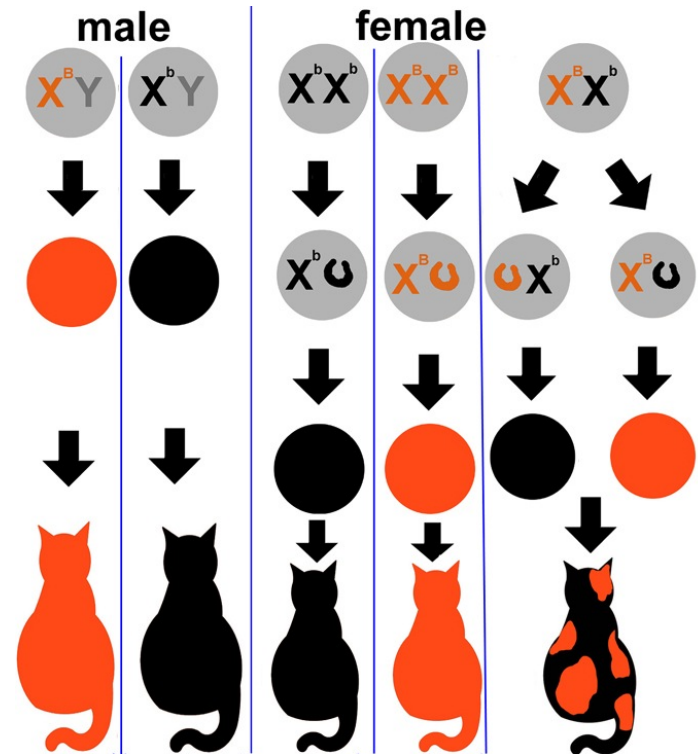




Eg. calico cats can only be female! Orange and black hair colour is found on the X- chromosome.



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.

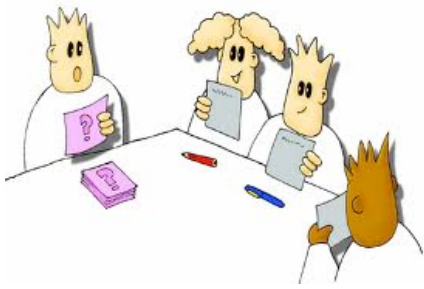




←— George is Male



*Everything that is said is true, but... every once in a while there is the **rare** male calico cat. Can you explain this?*



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?