

CONCEPT 5

Some inherited traits are due to alleles on the sex chromosomes.

Activity

Colour Perception

Some people's perception of colour differs from other people. One form of colour vision deficiency involves difficulty distinguishing between the colours red and green. Your teacher may provide a red-green colour vision deficiency test or data from such a test. Based on the data, what conclusions about the pattern of inheritance for red-green colour vision deficiency can you make?



sex-linked trait a trait controlled by genes on sex chromosomes

Figure 1.20 As an X-linked trait, colour vision deficiency occurs more often in males than in females. **A** A person who is not colour vision deficient can see all colours. **B** People with red-green colour vision deficiency view red and green as shades of grey. **C** The Punnett square shows how the sex-linked trait is inherited.



C

	X^B	Y
X^B	$X^B X^B$	$X^B Y$
X^b	$X^B X^b$	$X^b Y$

X^B = Normal
 X^b = Red-green colour vision deficiency
 Y = Y chromosome

Traits controlled by genes located on the sex chromosomes are called **sex-linked traits**. Traits controlled by genes on the X chromosome are called *X-linked traits*. Because genetic males have only one X chromosome, they are affected by recessive X-linked traits more often than are genetic females. Females are less likely to express a recessive X-linked trait, because the other X chromosome may mask the effect of the trait.

Red-Green Colour Vision Deficiency

The trait for red-green colour vision deficiency is a recessive X-linked trait. **Figures 1.20A** and **1.20B** show how a person with red-green colour vision deficiency might view colours compared to a person who does not.

Use the Punnett square in **Figure 1.20C** to study colour vision deficiency further. The mother is a *carrier* for the trait, because she has the recessive allele on one of her X chromosomes. The father is not colour vision deficient, because he does not have the recessive allele. Notice that the only offspring that can have red-green colour vision deficiency is a male child. As a result of it being an X-linked trait, red-green colour vision deficiency is very rare in females.



Before you leave this page . . .

1. What are sex-linked traits?
2. Use vocabulary terms to describe the genotype of a male who is red-green colour vision deficient.