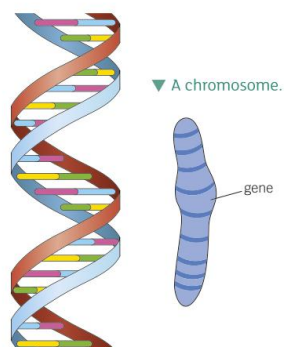


3.5 Inheritance

Learning objectives

After this topic you will be able to:

- describe how characteristics are inherited
- describe how scientists worked together to develop the DNA model.



▲ The shape of DNA is a double helix – a bit like a twisted ladder.

DNA timeline

Carry out some research to produce a timeline, showing the key steps in scientists' understanding of DNA.

Link

You can learn more about DNA in B3 2.5 DNA

You can often tell if people are members of the same family, as they look alike. The children have inherited some characteristics from each of their parents. Brothers and sisters do not look completely the same, as they each inherit a different mixture of characteristics.

How do you inherit characteristics?

You inherit characteristics from your parents through genetic material stored in the nucleus of your cells. This material is a chemical called **DNA** (deoxyribonucleic acid). DNA contains all the information needed to make an organism.

A State what DNA is.

Chromosomes

Inside the nucleus, your DNA is arranged into long strands called **chromosomes**. Different species have a different number of chromosomes in their nucleus. Humans have 46 chromosomes; cats have 38 chromosomes.

You inherit half of your chromosomes from your mother and half from your father. This is why you share some of your characteristics with your mother and some with your father.

B State what a chromosome is.

Genes

Each chromosome is divided into sections of DNA. The sections that hold the information to produce a characteristic are called **genes**. For example, one gene contains the information that sets your eye colour, while a different gene sets your hair colour. Each chromosome contains thousands of genes.

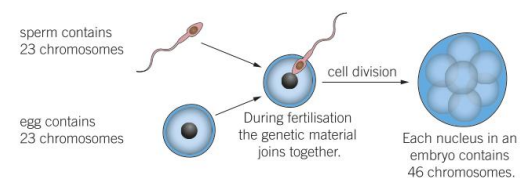
C State what a gene is.

How is genetic material inherited?

Inside the nucleus of your cells, the 46 chromosomes are arranged into 23 pairs. One copy of the chromosome of each pair comes from your mother, and the other comes from your father.

B2 Chapter 3: Adaptation and inheritance

Egg and sperm cells are the only cells to contain 23 chromosomes. They only have one copy of each chromosome. During fertilisation, the egg and sperm cells join together. When their nuclei join, their chromosomes pair up, producing an embryo with 46 chromosomes.



▲ You get half of your genetic material from your mother, and half from your father.

D State the number of chromosomes present in a normal human body cell.

Discovering DNA

Four scientists worked together to produce a model of the structure of DNA.

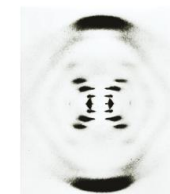
In the early 1950s two scientists, Rosalind Franklin and Maurice Wilkins, used X-rays to investigate the structure of DNA. The image they produced is shown above.

James Watson and Francis Crick, scientists working at another university, were also studying DNA. When they saw this image it told them that DNA had a helical shape. Through further investigations, Watson and Crick worked out that the structure of DNA is like a twisted ladder. This is known as a double helix.

In 1962 Crick and Watson, along with Wilkins, won the Nobel Prize for Medicine for their discovery. Franklin died in 1958; some people say that at the time her role in this famous discovery wasn't recognised.

Team work

The scientists who discovered the structure of DNA did so by working together. Communication is very important so that scientists can share their ideas and carry out investigations. Watson and Crick were able to work out the structure of DNA by building on the work of Franklin and Wilkins.



◀ The first image of DNA, produced using X-rays.

Key Words

DNA, chromosome, gene

Summary Questions

- Copy and complete the sentences below.
Genetic material in the body is stored in the _____ of a cell.
_____ is the name of the chemical that contains the instructions needed to make an organism.
_____ are made of long strands of DNA.
The sections of DNA that hold the information for a _____ are called _____.
(5 marks)
- Arrange these objects in order of size, starting with the smallest.
cell chromosome gene DNA nucleus
(2 marks)
- Describe how scientists worked together to discover the structure of DNA.
(2 marks)
- Explain in detail why you share some characteristics with your mother and some with your father.
(6 marks)