

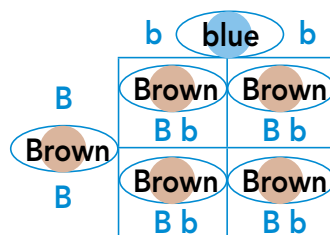
Biology

- 1 Work in a small group. Look at the photo in the article. How many different characteristics can you see? Make a list.
- 2 In the article you are going to read about why individuals have different characteristics. Quickly read the text and note the examples of different characteristics mentioned in the text.

Genetics and inheritance

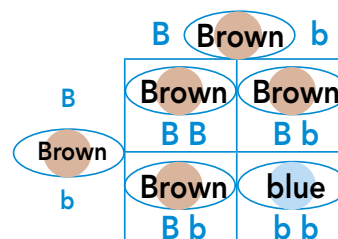
The characteristics each individual possesses, such as hair colour, are not down to chance, but are passed from one generation to the next through genetic information. This is the reason why we tend to resemble our parents and often our grandparents. This passing down of genetic information is known as inheritance, and the study of inheritance is called genetics.

Genetic information is contained within our body in DNA. DNA is contained in almost all of our cells and is very long and thin. It is formed into short structures called chromosomes, which are found in the nucleus of the cell. We have 23 pairs of chromosomes in each cell - half from our father and half from our mother. A gene is a section of DNA found within a chromosome that determines a particular characteristic. Some characteristics, such as eye colour, are controlled by a single gene, which may have different forms. These are called alleles. Alleles can be dominant or recessive: dominant alleles always express themselves (i.e. the person has this characteristic), regardless of which allele they are paired with. Recessive alleles will be suppressed or remain dormant if they are paired with a dominant allele. They will only express themselves if they are paired with another recessive allele.



In order to help us to better understand this, let's take the example of eye colour. The allele for brown eyes is dominant and the allele for blue eyes is recessive. Note: in genetic diagrams, dominant genes are always shown with a capital letter and recessive genes with a lower case letter. In the first diagram on the left, one parent has brown eyes. Both alleles are the dominant (brown) allele. The other parent has blue eyes. Both alleles are the recessive (blue) allele. All the different outcomes are shown in the square below. In all of the outcomes the child will receive one brown allele from one parent and one blue allele from the other. Because brown is dominant, all children will have brown eyes.

Now let's take a look at an example with two brown-eyed parents. Each parent has one brown and one blue allele. The different outcomes are shown to the right. In three of the outcomes the child will have brown eyes. However if the child received the recessive blue-eyed gene from each parent, this would result in blue eyes. So, the assumption that two brown-eyed parents can only have a brown-eyed child is shown to be a misconception.



The study of genetics and DNA is invaluable. Not only does it help us to understand why we look the way we do and why only some of us can do certain things, such as roll our tongues, it can also identify whether individuals are at risk of inheriting life-threatening conditions, such as cystic fibrosis, a condition that is caused by a recessive allele.

3 Match each term from the text with the correct definition.

- | | | |
|---------------|-------|---|
| 1 inheritance | | a the long, thin material that contains genetic information |
| 2 genetics | | b genes that can have different forms and be either dominant or recessive |
| 3 DNA | | c the study of how characteristics are passed down |
| 4 chromosome | | d a section of DNA that determines a characteristic |
| 5 gene | | e short strands of DNA organised into pairs |
| 6 allele | | f the passing down of characteristics from one generation to the next |

4 Read the text in more detail and answer the questions.

- Why do people tend to resemble their parents and grandparents?
.....
- What is a dominant allele?
.....
- What is a recessive allele?
.....
- Can two brown-eyed parents produce a blue-eyed child? Why/Why not?
.....
- How can the study of genetics and inheritance help in medicine?
.....

5 Work with a partner and discuss the questions.

- What did you find most interesting about the text? Was there any information that you found surprising?
- Think about your own family. Who do you look like more, your mother or your father? Are there any characteristics that you've clearly inherited from one parent?
- Can two blue-eyed parents produce a brown-eyed child? Why/Why not?

?? DID YOU KNOW?

Although each person's DNA is unique (except in the case of identical twins), any two individuals actually share 99.9% of their DNA. It is only 0.1% that is different. Humans share a massive 98% of DNA with chimpanzees and 21% with worms!

PROJECT

- Work in pairs. Think of another characteristic that is determined by dominant or recessive genes, for example, hair colour, dimples, freckles, hair type, (e.g. coarse, curly, fine) free or attached earlobes.
- Use the Internet to find a Punnett square to illustrate the chances of inheriting that characteristic.
- Make notes on how to explain the Punnett square.
- Tell the rest of the class about the characteristic you researched and explain the different possible outcomes.

VOCABULARY FOCUS

misconception [n]: a wrong belief or opinion as a result of not understanding something

nucleus [n]: the central part of a cell that contains the chromosomes

resemble [v]: to be similar to someone or something, especially in appearance

suppress [v]: to stop an activity from happening