

## 3.6 Natural selection

### Learning objectives

After this topic you will be able to:

- describe the process of natural selection
- describe how organisms evolve over time.

### Fantastic Fact

More proof for evolution comes from your DNA. You share about 97% of your DNA with a gorilla and 50% with a banana! This is evidence that all living things evolved from the same ancestor.

**Have you heard the phrase 'survival of the fittest'? It means that organisms that are best adapted to a situation will survive, and those that are not will die. This is how scientists think that all organisms on Earth have developed.**

### What is evolution?

Scientists have shown that the species we see on Earth today have gradually developed over millions of years. This process is called **evolution**.

Evolution started with unicellular organisms. These organisms, similar to bacteria, lived in water more than three billion years ago. Over time they evolved to become multicellular organisms. Eventually, this process resulted in organisms that could live on land and in the air.

#### A State what is meant by evolution.



▲ A dinosaur fossil.

The **fossil** record provides most of the evidence for evolution. Fossils are the remains, or traces, of plants or animals that lived many years ago. They have been preserved by natural processes. The fossil record provides evidence of species that no longer exist, such as dinosaurs.

#### B Describe what a fossil is.

### Key Words

evolution, fossil, natural selection

### Evolution cartoon

Produce a cartoon strip showing the evolution of an organism of your choice – this could be a real organism or a made-up one.

108

## Resources

● B2 Chapter 3: Adaptation and inheritance

### How do organisms evolve?

Organisms evolve through the process of **natural selection**.

They change slowly over time, to become better adapted to their environment. The process takes many years, sometimes millions, as it happens over a number of generations.

#### C Describe the process of natural selection.

### Peppered moths

Living organisms are continually evolving to adapt to their environment. Evolution usually happens slowly over many years. However, dramatic changes in an organism's environment can result in evolution happening quickly. Peppered moths evolved in this way during the 19<sup>th</sup> century.

Before the Industrial Revolution, most peppered moths in Britain were pale coloured. This was helpful to the moths, as they blended in with tree bark. A few peppered moths were dark coloured. This was a disadvantage, as they were easily seen by birds, and eaten. The pale moths were more likely to survive and reproduce, so most of the peppered-moth population was pale coloured.

After the Industrial Revolution many trees were covered in soot, turning the bark black. This meant that the dark moths were camouflaged. More dark peppered moths survived and reproduced than pale moths. After several years, the population of dark peppered moths in towns and cities became much higher than the population of pale peppered moths.



▲ Before the Industrial Revolution, pale peppered moths were highly camouflaged against tree bark. Dark moths were easily seen.



▲ After the Industrial Revolution, dark peppered moths were more camouflaged against soot-blackened trees and pale moths were easily seen.

### Natural selection

Organisms in a species show variation – this is caused by differences in their genes.

The organisms with the characteristics that are best adapted to the environment survive and reproduce. Less well adapted organisms die. This process is known as 'survival of the fittest'.

Genes from successful organisms are passed to the offspring in the next generation. This means the offspring are likely to possess the characteristics that made their parents successful.

This process is then repeated many times. Over a period of time this can lead to the development of a new species.

### Summary Questions

- Copy and complete the sentences below.  
All living organisms have \_\_\_\_\_ from a common ancestor. This process has taken \_\_\_\_\_ of years. \_\_\_\_\_ provide evidence for evolution. These are the \_\_\_\_\_ of plants or animals that died long ago, which have turned to \_\_\_\_\_.  
(5 marks)
- Describe the process of natural selection.  
(3 marks)
- Explain in detail how peppered moths evolved as a result of the Industrial Revolution.  
(6 marks)

109