

## YEAR 6 UNIT 3: We're evolving (Evolution and Inheritance)

### Enquiry Question: How have living things changed over time?

**Related units:** Year 3 Unit: Rocks. How have rocks changed over time?

#### Unit overview

##### **National Curriculum Link Year 6:** Evolution and Inheritance

Children will recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. They will recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. They will be able to identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Building on what they learned about fossils in the topic on rocks in year 3, pupils should find out more about how living things on earth have changed over time. They should be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution. Note: at this stage, pupils are not expected to understand how genes and chromosomes work. Children already know that we all have different characteristics like eye colour, nose shape and hair colour and that offspring look similar to their parents. They understand that living things pass on characteristics to their offspring and that living things can become adapted to their habitats and that species evolve over time.

#### Scientific vocabulary

Variety  
Inherited  
Evolution  
Adaption  
Natural selection  
Fossil  
Dinosaur  
Prehistoric  
Genes  
Inheritance  
Characteristics  
Charles Darwin  
Galapagos  
Island  
Lyme Regis  
Specimens  
Ice age

#### Assessment

1. Explain how polar bears survive in very cold places
2. Explain how parents and offspring look different and what these differences might be
3. Explain what the evidence from fossils tell us
4. Explain simply how things change and evolve over time

#### Working Scientifically

##### **You look like your dad!**

Record data and results using tables.

##### **Adaptation**

Record data using diagrams.

##### **How have they changed?**

Record results, report and present findings, including conclusions, causal relationships and explanations.

##### **Natural selection**

Record results, report and present findings, including conclusions, causal relationships and explanations. Identify scientific evidence that has been used to support ideas.

##### **All change**

Identify scientific evidence that has been used to support ideas.

##### **Life on Earth timeline**

Identify scientific evidence that has been used to support ideas.

Identify scientific evidence that has been used to support ideas.

To know about the life and work of a scientists – Mary Anning.

#### Cross-curricular links

**English:** Explanation text on Evolution; Report and present findings, including conclusions, causal relationships, and explanations.

**Maths:** Record data and results using tables.

## Teacher knowledge

**The way we look is controlled by our genes, which are a mixture of those from your parents – half from the mother and half from the father.**

Some characteristics are carried by a single pair of genes, others by lots of genes working together. Some characteristics, such as brown eyes, are dominant. If your mother has a blue-eyed gene and your father a brown version and these come together in the fertilised egg cell, the brown will 'win' and you will have brown eyes. Only if you have two blue-eyed genes will you have blue eyes. In this way, two people with brown eyes could both have the blue-eyed gene and have a blue-eyed baby. The only exception to this is with identical twins. In this case, a fertilised egg splits in two. The genes in each half will be exactly the same, and so twins formed in this way will look identical in many ways. But even identical twins can look slightly different: they might decide to change their hair style, or hair colour, eat different diets, etc. These are environmental changes, rather than genetic ones. External features can also change how we look, as well as our genes.

**The process of evolution by natural selection was proposed by Charles Darwin in 1858 and was based on work he carried out over the previous 30 years.** It is important to note that animals do not 'choose' to change. They have an advantage over other animals, so will survive long enough to breed and pass on their characteristics. During his time on the Galapagos Islands, Darwin collected specimens of the different species of finch living on the island. It wasn't until he returned to the UK that he studied these specimens and realised how important they were. By noticing that finches on the different islands had beaks that were adapted to their environment and realizing that finches whose beaks weren't adapted wouldn't survive, Darwin was able to start working out his theory of evolution. Evolution is not 'just a theory'. There is an overwhelming amount of supporting evidence and scientists believe it is the best mechanism for explaining how the wide variety of life on Earth came about. The process takes place over very long timescales: for example, the evolution of the polar bear from the brown bear took over 100,000 to 250,000 years. Brown bears gradually moved north in search of food. Those bears best suited to life in the cold survived and passed on those characteristics to their offspring.

**Planet Earth is 4.6 billion years old.** The first life began in the seas around 3.6 billion years ago. The earliest life was single-celled creatures like bacteria and algae. Gradually life became more complex and multicellular life began.

**Human beings have only been around for a tiny fraction of the Earth's history.** If the entire history of the Earth were condensed into a 24-hour day, Homo sapiens would not appear until a few seconds before midnight.

**Fossils tell us a lot about living things that died millions of years ago.** The parts that become fossilised can tell us about how they looked, how big they were and even what they ate by looking at their teeth (and sometimes fossilised poo!). There are some things we can't work out so easily, such as their skin colour or texture, as skin does not fossilise. Areas such as Lyme Regis on the south coast of England are excellent places for fossils. The cliffs are made of sedimentary rock, such as limestone and sandstone, that would have been at the bottom of the sea millions of years ago. Chalk cliffs are made from the skeletons of billions of microscopic sea creatures. Creatures that died in this sea would have sunk to the bottom, in some cases become buried, and eventually become fossils. Millions of years later, the movement of the Earth's plates pushed the sea floor upwards, forming land. Fossil seashells have sometimes been found at the top of high mountains. A very famous site for fossils is called the Burgess Shale in Yoho National Park in the Canadian Rockies. 500 million years ago, it used to be sea floor, but now is 2000 m above sea level!

**Mary Anning was born on 21st May 1799 into a poor family in Lyme Regis on the Dorset coast.** Her parents had 10 children but they all died except for Mary and her brother Joseph. Her father was a carpenter and taught Mary how to find and clean fossils. They called them 'curiosities' and sold them to tourists from a stall. The rhyme 'She sells sea shells on the sea shore' might be about Mary! The cliffs at Lyme were full of fossils of belemnites and ammonites from 200 million years ago, and sometimes larger fossils of reptiles and fish. They were revealed when the sea and storms broke up the rocks of cliffs. When Richard died in 1810, the family were even poorer and life was very hard. Mary was only 11, but she made some money for the family by finding and selling fossils. In 1811, Joseph found a fossil skull sticking out of a cliff. Over the next few months Mary carefully uncovered an almost complete skeleton of what she

thought was a 'crocodile'. A wealthy local man bought this and then sold it to William Bullock for his Museum of Natural Curiosities in London. The fossil was named Ichthyosaurus, which meant 'fish-lizard'. Mary continued to make important new finds. She found more complete skeletons of ichthyosaurs as well as: a complete skeleton of the long-necked Plesiosaurus in 1823 the first skeleton of Pterodactyls (the flying dragon) in 1828 Squaloraja, a fossil fish half way between a shark and a ray, in 1829 a new large-headed Plesiosaurus in 1830. Scientists acknowledged Mary as a fossil expert. Many important scientists visited and wrote to her. In 1837, some of them raised money to make her an annual payment. They also made her an honorary member of the Geological Society even though women were not allowed to be members at the time. Mary Anning only left Lyme Regis once in her lifetime, for a short trip to London, and she died at the age of 47 from cancer.

#### **Did you know?**

- Meerkats have dark circles around their eyes, which act like sunglasses, helping them see even when the sun is shining very brightly.
- Some animals use camouflage colours to help them blend in with the background and stop predators seeing them.
- Sometimes predators also use it to avoid being spotted by their prey.
- The blue whale can produce the loudest sound of any animal. At 188 decibels, the noise can be detected over 800 kilometres away. Why would they need to do this?
- Even when a snake has its eyes closed, it can still see through its eyelids. Why would this be an advantage?

#### **Misconceptions: Children might think...**

- that boys will look like the father's side of the family and girls like their mother's side. In fact, the way we look is controlled by our genes, which are a mixture of those from your parents – half from the mother and half from the father.
- that particular features are identical, such as mother's nose and father's eyes, rather than them being a blend of the two. See above
- that evolution can only happen over millions of years. In fact, living things adapt all the time in order to survive.
- that fossils are very large and only of dinosaurs. In fact, a fossil is any preserved remain, impression or trace of any once-living thing from particular geological ages. Examples include bones, shells, exoskeletons and stones.

## **Resources**

[www.sciencekids.co.nz/sciencefacts/earth/fossils.html](http://www.sciencekids.co.nz/sciencefacts/earth/fossils.html) information to remind children about fossil formation.  
[www.sheppardsoftware.com/scienceforkids/dinosaurs/games.html](http://www.sheppardsoftware.com/scienceforkids/dinosaurs/games.html) has some games and activities (some low level) linked to differences between carnivores and herbivores and also building a dinosaur from parts. [www.agiweb.org/news/evolution/examplesofevolution.html](http://www.agiweb.org/news/evolution/examplesofevolution.html) has some images and information about change over time.  
[www.fossilsforkids.com/](http://www.fossilsforkids.com/) is a great page for children to use. If you are really keen on setting up a dinosaur dig, then this link has some very clear instructions and is really great to bring it alive: <http://www.educationalinsights.com/text/EI/downloads/guides/5136%20T-Rex-G.pdf>





