TOPIC 3 Evolution and inheritance

About this topic

Curriculum link: Year 6, Evolution and inheritance

SUMMARY:

Building on what they learned about fossils in Year 3, children find out more about how living things have changed over time. They are introduced to the idea that characteristics are passed from parent to their offspring, but that they are not exactly the same. They should also appreciate that variation over time can make animals more or less likely to survive in particular environments (adaptation). Children look at evolution and Charles' Darwin's theory of natural selection, as well as palaeontologist Mary Anning's work with fossils.

UNITS:

3.1: What can fossils tell us?
3.2: Inheritance and adaptation
3.3: Evolution

ACTIVITY RESOURCES:

3.1 Adaptation – penguin
3.2 Adaptation – camel
3.3 Adaptation – cactus
3.4 Charles Darwin
3.5 Charles Darwin presentation

ONLINE RESOURCES:

Teaching slides (PowerPoint): Evolution and inheritance
Interactive activity: Evolution and inheritance
CPD video: Evolution and inheritance
Pupil video: Evolution and inheritance
Word mat: Evolution and inheritance
Editable Planning: Evolution and inheritance
Topic Test: Evolution and inheritance

Learning objectives

This topic covers the following learning objectives:

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

Working scientifically

This topic develops the following working scientifically skills:

- Identify scientific evidence that has been used to support or refute ideas or arguments.

CROSS-CURRICULAR LINKS

This topic offers the following cross-curricular opportunities:

English

- Make links with Kipling's *Just So Stories*. Contrast these with the actual process of natural selection. Audio versions can be found on the Storynory site: www.storynory.com/category/rudyard-kipling/
- Research and write a biography of Mary Anning.
- Research and write information cards for museum fossil exhibits.
- Research the life and work of Charles Darwin, Alfred Russel Wallace.
- Script an animation showing evolution.
- Research how scientists and farmers use inheritance, e.g. breeding animals and growing plants.
- Create a new animal and produce a fact card showing its inherited features and adaptations.

- Draft and re-daft an explanation on breeding dogs to create a new breed for a specific owner.
- Read diary entries from Darwin, write a diary entry.
- Use a graphic organiser to record and compare similarities and differences.
- Read *The Rabbit Problem* by Emily Gravett
- Present a report about the peppered moth, or enact this as a drama to illustrate what happened. This could be as a school assembly.
- Write a script for their presentation and use their reading and research skills to create it.

Numeracy and mathematics

- Produce graphs and charts from the data collected.

Computing / ICT

- Use interactive games that model evolution.
- Produce an audio or video presentation on evolution of an animal.
- Use the Internet safely to research information.
- Produce an audio or video podcast-style presentation, depending on the equipment and time available, or could produce a regular presentation.
- Use software such as Comic Life to create a comic strip story about Mary Anning or a news report.
- Use desktop publishing packages to produce fact cards on dinosaurs.

Geography

- Plot Darwin's Voyage on the *Beagle*.
- Find the Galapagos islands on a map or globe.

History

- Research and create a timeline to show how the modern horse has evolved from the hyracotherium.
- Learn about Charles Darwin and conditions aboard the *Beagle*, comparing between then and now.
- Discuss creation ideas of various religions and why Darwin's theory caused such a stir in Victorian times.

Outdoor learning

- Children observe animals and plants and how they have adapted to their habitats.

STEAM (SCIENCE TECHNOLOGY ENGINEERING ART AND MATHS) OPPORTUNITIES

Invite into class

- A biologist from a local secondary school or university to work with children.
- A vet or dog breeder.
- A palaeontologist from a local university or museum.
- A local conservationist to talk about conserving plants and animals in your region.

Visit

- Local museum to research fossils and question experts.

TEACHER SUBJECT KNOWLEDGE

Inheritance

The way we look is controlled by our genes, which are a mixture of those from our 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.

In the case of identical twins, 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.

Evolution

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 realising 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 between 100,000 and 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.

Fossils

Planet Earth is 4.6 billion years old. The first life began in the seas around 3.6 billion years ago. The earliest life were 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 was condensed into a 24-hour day, Homo sapiens wouldn't 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 to find 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 ocean floor and 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!

CHILDREN'S MISCONCEPTIONS

Children may believe…

- That boys will look like the father's side of the family and girls like their mother's side.
- That particular features are identical, such as mother's nose and father's eyes, rather than them being a blend of the two.
- That evolution can only happen over millions of years.
- That fossils are very large and only of dinosaurs.

Children already know …

- That we all have different characteristics like eye colour, nose shape and hair colour.
- That offspring look similar to their parents.

SCIENTIFIC VOCABULARY: EVOLUTION AND INHERITANCE

You can download a Word mat of essential vocabulary for this topic from *My Rising Stars.*

adaptation: a small change that a living thing goes through

dinosaur: a particular kind of reptile that lived in prehistoric times

evolution: change in living things over time

fossil: a living thing that has been turned to stone by one of several methods

inherited: the way that a trait or characteristic is passed to offspring from parents

natural selection: a process in which living things adapt themselves in order to survive, that they don't have any control over

prehistoric: the time classed as 'before history' as it was so long ago it hasn't been recorded or written

variety: differences between things as part of a whole group

What does the fossil tell us?

© Bastos / Adobe stock

- Creatures that died in the sea would have sunk to the bottom and in some cases become buried and eventually become fossils.