



## **Wellington Primary Science**

### **Parental Information**

**Year Group – 6**

**Term – Autumn**

**Topic – Evolution and Inheritance**

In the Evolution and Inheritance project, your child will learn about the five kingdoms scientists group living things into based on their characteristics. They will discuss what fossils are, revisit how they form and learn about the fossil record before classifying fossils, using what they have learned about the features of living things. Children will discuss the theory of evolution and the scientists who founded it in the 19th century, Charles Darwin and Alfred Russell Wallace, learning that all living things on Earth are related and have gradually changed over time. They will learn that fossils and the DNA of extinct and living things provide evidence for the theory of evolution and then study a scientific diagram called an evolutionary tree, identifying the relationships between past and present-day living things. Children will learn the meaning of the terms 'inheritance' and 'variation' and how evolution relies on them. They will discuss examples of inherited and non-inherited features and continuous and discontinuous variation within humans before collecting and displaying class data about eye colour as a bar chart and heights as a line graph. They will revisit the meaning of 'adaptation' and use new scientific terminology, including 'natural selection' and 'survival of the fittest'. They will learn about adaptation in animals by investigating how birds' beaks have changed over time to improve their ability to catch and eat specific foods. They will learn about adaptation in plants, including structural, behavioural and chemical adaptations, and then investigate the leaves of trimmed and untrimmed holly plants, observing how holly plants can adapt to become spikier to survive. They will complete their learning by holding a class debate about artificial selection using evidence from research and presenting an argument for and against its use.

**Your child will receive a copy of the knowledge organiser below to aid their learning. Please take time to look through this at home with your child.**

**Your child will be bringing home a 'Home Learning' guide and workbook, in which they can record home learning tasks for this topic. Included is a further reading suggestion list and some suitable child friendly websites, which can be used to deepen their understanding of the topics that they will be covering in class.**

**Class teachers will guide your child on activities which will directly support that week's learning and any homework expectations – there is no requirement for the children to complete all of the tasks in the pack.**

**Should you have any questions please don't hesitate to contact the Year Group Team.**

# Evolution and Inheritance

## Classification

Grouping living things based on their characteristics is called classification. The first classification system developed by the Swedish scientist Carl Linnaeus (1707–1778) divided all living things into two kingdoms, animals and plants. Today, scientists classify all living things into five kingdoms. The members of each kingdom have specific features in common.

Kingdom	animal kingdom	plant kingdom	fungus kingdom	protista kingdom	monera kingdom
					
Features	<ul style="list-style-type: none"> <li>• multicellular</li> <li>• cannot make food</li> <li>• can move</li> <li>• live on land or in water</li> <li>• reproduce sexually</li> </ul>	<ul style="list-style-type: none"> <li>• multicellular</li> <li>• make food using sunlight</li> <li>• cannot move</li> <li>• live on land or in water</li> <li>• reproduce sexually or asexually</li> </ul>	<ul style="list-style-type: none"> <li>• unicellular or multicellular</li> <li>• cannot make food</li> <li>• cannot move</li> <li>• live on land or in water</li> <li>• reproduce sexually or asexually</li> </ul>	<ul style="list-style-type: none"> <li>• unicellular or multicellular</li> <li>• some make food, others can not</li> <li>• most can move</li> <li>• live in water</li> <li>• reproduce sexually and asexually</li> </ul>	<ul style="list-style-type: none"> <li>• unicellular</li> <li>• make food</li> <li>• most can move</li> <li>• live on land or in water</li> <li>• reproduce asexually</li> </ul>

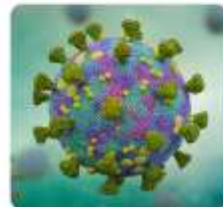
## Microorganisms and viruses

A microorganism is a living thing. It is too small to be seen without a microscope. Microorganisms can be found in the fungus, protista and monera kingdoms. Most microorganisms are beneficial. For example, cyanobacteria make oxygen, and a unicellular fungus called yeast is added to bread to make it rise. Some microorganisms are pathogens, which means they cause disease in other living things.

Viruses are not microorganisms as they are not living and need a host to survive. They are not part of any of the kingdoms. Some viruses can be beneficial and others harmful. For example, the virus SARS-CoV-2 causes the illness COVID-19.



cyanobacteria



SARS-CoV-2 virus

## Fossils and the fossil record

Fossils are the remains of once-living things or traces of life, such as footprints, tracks, dung or burrows, that have been preserved as rock. Preserved remains and traces of life are called fossils if they are over 10,000 years old.

The fossil record was created by scientists to group and make sense of the vast amount of fossils that have been discovered. It is ordered from the oldest fossils found deepest in the ground to the newest fossils found closest to the surface. It provides a history of the Earth.

The fossil record tells us about:

- the living things that have inhabited Earth
- the Earth's environment over time
- how species have evolved
- extinction events

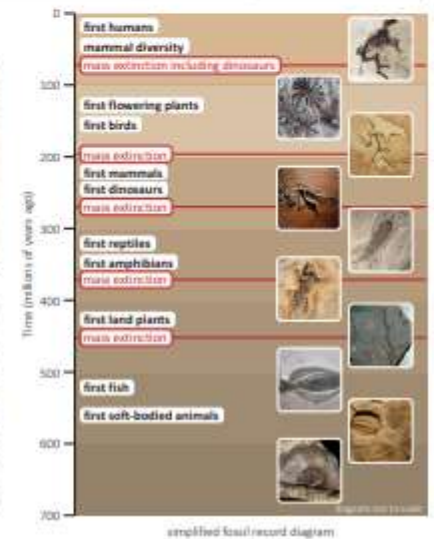
However, the fossil record is incomplete because soft-bodied animals decayed too quickly to be fossilised and fossils are still buried in the Earth's rocky layers.



fossilised turtle



fossilised footprint



## The theory of evolution

The theory of evolution was first developed by the naturalists Charles Darwin and Alfred Russel Wallace in 1858.

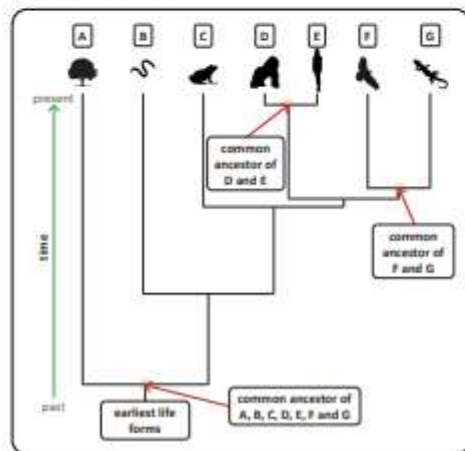
The theory states three assumptions:

- All life on Earth has evolved from simple life forms to more complex ones over time.
- All life on Earth has common ancestors and is therefore related.
- Living things with characteristics most suited to their environment are more likely to survive and reproduce.

At first, the theory was controversial. Some saw it as an explanation for the variety of species on Earth, but others saw it as blasphemous as it challenged the Christian belief that God created the Earth and all living things. Today, the fossil record and DNA evidence support the theory of evolution.

## Evolutionary tree diagrams

Charles Darwin sketched a branching tree diagram to help explain the theory of evolution. Evolutionary tree diagrams today represent what scientists think they know about the evolutionary relationships between different living things; however, they are not fact. Those living things with a more recent common ancestor, such as D and E, are said to be more closely related than those with a less recent common ancestor, such as F and G.



Simplified evolutionary tree diagram

## Inheritance

Living things that sexually reproduce pass on inherited characteristics to their offspring, such as skin colour and eye colour. Offspring inherit one copy of each gene from the female parent and one from the male parent. This mixing of genes means that offspring are unique, differing from their parents and each other.

## Variation

Variation is the natural differences in characteristics between individuals of the same species. There are two types of variation: continuous and discontinuous. Continuous variation has a range of values, such as the height or mass of individuals of the same species. Line graphs display continuous variation. Discontinuous variation has a specific number of outcomes, such as eye colour or blood groups. Bar charts show discontinuous variation.

## Natural selection, adaptation and survival of the fittest

Natural selection is the process behind the theory of evolution. Variation within a species is caused by small, natural changes in DNA between individuals and the random mixing of parent DNA following sexual reproduction. If a variation positively affects a living thing's ability to survive, they are more likely to live long enough to reproduce and pass on the attribute to their offspring. This process naturally selects those individuals who are better able to survive in their habitat, and is known as 'survival of the fittest.' Over time, positive attributes become common among a species and are seen as adaptations. For example, ancestors of the giraffe had shorter necks, but due to variation and natural selection, individuals with longer necks became common in the species.

There are three different types of plant adaptation:

**Structural:** Cacti have modified leaves called spines to deter animals from eating them.

**Behavioural:** Mature sunflowers face the rising Sun in the east because pollinators prefer warm flowers.

**Chemical:** Stinging nettles have hairs containing chemicals that sting when touched to deter animals.



## Artificial selection

Artificial selection, also called selective breeding, is the process where humans breed animals and plants to produce offspring with what they consider to be desirable characteristics.

Examples include breeding cows that produce large quantities of milk or crops that are disease-resistant and produce lots of grain.



## Glossary

<b>adaptation</b>	A physical or behavioural characteristic that allows a living thing to better survive in its habitat.
<b>ancestor</b>	A living thing from which others have evolved.
<b>deoxyribonucleic acid or DNA</b>	The inherited material inside all cells that carries the instructions needed for that living thing to develop and survive.
<b>evolve</b>	To change gradually over a long period of time.
<b>gene</b>	A small section of DNA that acts as instructions for a specific inherited characteristic, such as eye colour.
<b>multicellular</b>	Consisting of many cells.
<b>species</b>	A group of similar living things that can reproduce naturally.
<b>unicellular</b>	Consisting of a single cell.

