

Evolution and Inheritance

Classification

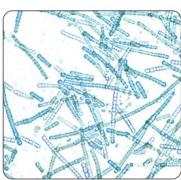
Grouping living things based on their characteristics is called classification. The first classification system developed by the Swedish scientist Carl Linnaeus (1707–1778) divided all living things into two kingdoms, animals and plants. Today, scientists classify all living things into five kingdoms. 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">multicellularcannot make foodcan move from place to placelive on land or in waterreproduce sexually	<ul style="list-style-type: none">multicellularmake food using sunlightcannot move from place to placelive on land or in waterreproduce sexually or asexually	<ul style="list-style-type: none">unicellular or multicellularcannot make foodcannot move from place to placelive on land or in waterreproduce sexually or asexually	<ul style="list-style-type: none">unicellular or multicellularsome make food, others can notmost can move from place to placelive in waterreproduce sexually and asexually	<ul style="list-style-type: none">unicellularmake foodmost can move from place to placelive on land or in waterreproduce asexually

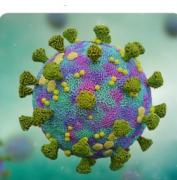
Microorganisms and viruses

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. 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.



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 and 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

Glossary

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

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

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

