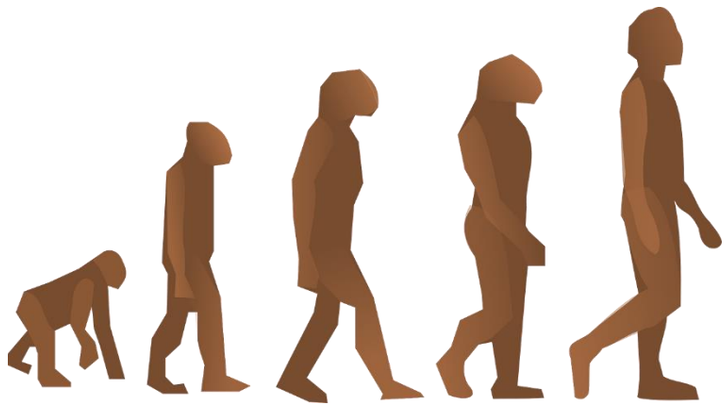
Population and the Planet (Science: Evolution)

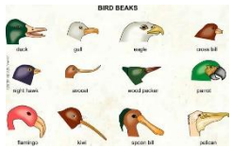
YEAR 6 | AUTUMN 2



KEY VOCABULARY

SPECIES

A group of living organisms consisting of individuals capable of exchanging genes or interbreeding.



CHARACTERISTIC

A feature or quality belonging to an organism

MUTATION

A change in a DNA sequence

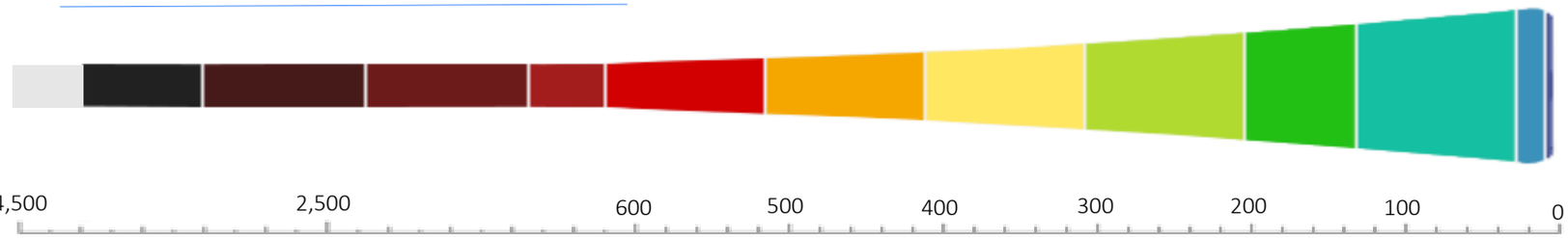
VARIATION

The presence of differences between living things of the same species is called variation.

ADVANTAGEOUS

Positive/beneficial – increasing the chances of success

TIMELINE OF LIFE ON EARTH



- 4.5 Billlion **Formation of Earth**
- 3.8 Billlion **Simple Cells**
- 3.0 Billlion **Photosynthesis**
- 2.0 Billlion **Complex Cells**
- 1.0 Billlion **Multicellular Life**
- 600 Million **Simple Animals**
- 500 Million **Fish and proto-amphibians**
- 400 Million **Insects and seeds**
- 300 Million **Reptiles**
- 200 Million **Mammals**
- 130 Million **Birds and flowers**
- 25 Million **Primates and apes**
- 2.5 Million ***Homo*** **(genus)**

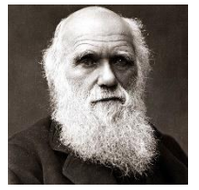
OVERVIEW

Living things change over time and this is called evolution. Evolution is a slow process that can take many thousands, even millions, of years to happen. Scientists have used fossil evidence to look at how organisms have adapted over millions of years and how their characteristics have changed.

Charles Darwin's theory of evolution suggested that different species have evolved from simpler life forms and that the organisms able to survive are those that have adapted best to their environment.

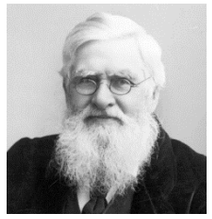
Natural selection is the idea that organisms that are best adapted are more successful, eventually passing on their successful characteristics to their offspring. We now know that DNA carries this genetic information and humans may even be able to edit this information in the future.

KEY PEOPLE



Charles Darwin

English naturalist, geologist and biologist, best known for his contributions to the science of evolution.



Alfred Russel Wallace

A naturalist who independently proposed the theory of evolution by natural selection. Wallace produced scientific journals with Darwin in 1858, which prompted Darwin to publish On the *Origin of Species* the following year.

Mary Anning

An English fossil collector, dealer, and palaeontologist who became known around the world for finds she made along the Dorset coast.

Watson and Crick

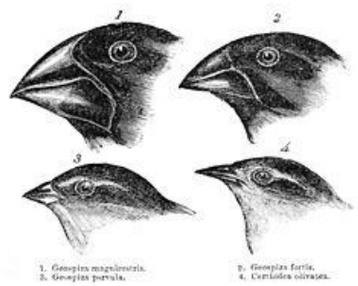
James Watson and Francis Crick are credited with the discovery of the structure of DNA whilst studying at the University of Cambridge. They were jointly awarded the Nobel Prize in 1962.

ADAPTATION

Living things are adapted to their habitats. This means that they have **special features** that help them to **survive.**

Adaptations can be:

- **Physical** (for example, extra fur)
- **Physiological** (for example, producing poison)



Darwin noticed that finches on the Galapagos Islands were (over many generations) adapting their beaks to the challenging environment. This, eventually, led to entirely new species of finches with differently shaped beaks. This helped solidify Darwin's idea of Natural Selection.

EXAMPLES OF ADAPTATION

Animals - Polar Bears

Polar bears are adapted to live in the Arctic. They hibernate through the most severe months and have:

- Thick white fur for camouflage.
- Greasy fur to remove water quickly after swimming.
- A thick layer of fat to keep warm.
- Sharp teeth and claws for hunting.
- Large feet to spread their weight on the snow and ice.

Plants - Cacti

- Stems that can store water.
- Widespread or very deep root systems that can collect water from a large area or from very deep underground.
- Spines which prevent the plant being eaten.
- The spines are modified leaves. These minimise the surface area and so reduce water loss.
- Very thick, waxy cuticle to reduce water loss.
- Reduced number of pores called stomata to reduce water loss.

NATURAL SELECTION

Natural selection is a process by which a species changes over time in response to changes in the environment, or competition between organisms, in order for the species to survive. It is sometimes referred to as 'survival of the fittest.'

The members of the species with the most desirable characteristics are able to produce the best-adapted offspring. If a species is unable to adapt then it is at risk of becoming extinct..

EXTINCTION

If a species is unable to adapt quickly enough to its environment, then it is at risk of becoming extinct. This can happen for many reasons:

- New predators
- New diseases
- Destruction of habitats
- Changes to the environment
- Increased competition for resources

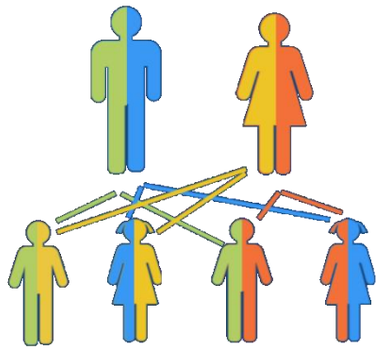
INHERITANCE

DNA carries **genetic information**. It has all the instructions that a living organism needs to grow, reproduce and function.

Genes are short sections of DNA. Genes carry information for particular characteristics, such as ear shape or eye colour. Different sets of genes carry information for different characteristics.

When reproducing, genes are passed on.

If two parents have the same characteristic, then their offspring (children) are more likely to display the same characteristic



NOTES

Tree of Life

A tour through the interconnectedness of life on Earth

PBS:Evolution

Games and information around the theory of evolution

Oak Academv

Animals and Humans over time unit – videos and challenges

UNIVERSITY OF CAMBRIDGE PRIMARY SCHOOL