Natural Selection and Evidence for Evolution.

Natural Selection

There are always **more** organisms **born** than **can survive**. Most will die before they reach adulthood because there are not **enough resources**, like **food** and **space**, for them all.

The **limited** resources cause **competition** between individuals. Individuals that have **variations adapted** to their environment are **more likely** to survive. Those that don't have variations adapted to their environment are likely to die. We call this **'survival of the fittest'** or **natural selection**.

Individuals that do survive are able to **breed** and pass on through **their genes their successful variations** to their offspring.

Evolution

This is the slow and continuous change of organisms from one generation to the next.

Charles Darwin, through observations, explained how evolution occurs with his theory of natural selection. He observed

- Populations of organisms show **variation** because of **differences** in their **genes**.
- Most organisms give birth to **more young** than can **survive** to adulthood.
- Populations of organisms don't **increase quickly in size** because individuals have to **compete** with each other for **resources**.
- Individuals with characteristics that make them **better adapted** to their environment have a **better chance of survival**, so are more likely to **breed** successfully. So, the **genes** responsible for the useful characteristics get **passed on** to the **next generation**.
- Individuals **less well adapted** to their environment may not compete successfully and are **less likely** to survive and reproduce.
- Over a long period of time their will be a higher proportion of individuals with **beneficial characteristics**, compared to those with **poorly adapted characteristics**. Eventually the poorly adapted characteristics may be **lost**.

Evidence to support Evolution

1. **DNA Research**

Theory of evolution suggests all organisms evolved from **shared common ancestors.**

Closely related species evolved to become different species, caused by diverged **gradual changes** in their **DNA**.

So organisms that have **recently** diverged from each other should have more **similar** DNA. This is what scientists found, e.g. **humans, apes** and **chimps** have similar DNA.

2. **Resistant Organisms**

Warfarin is a poison used to kill rats.

A certain gene in rats gives them a **resistance** to warfarin, so these rats survive and breed and **pass on** the resistant gene to their **offspring**.

Now we have populations of rats that are **warfarin-resistant**.

3. **Isolation**

On each side of the 'barrier' conditions are **slightly different**. For example they may have **different climates**.

Due to the different environments the **two separated populations** develop **different characteristics**, which become more common in each population, due to **natural selection**.