



Charles Darwin and Natural Selection

An idea that would change the world

Introduction



Charles Darwin developed his theory of evolution by natural selection using **four** important **observations** which led him to **two deductions**.

Observations:

1. All organisms produce more offspring than survive to adulthood.
2. Populations remain more or less constant in numbers.
3. Members of the same species show variation in characteristics.
4. Some characteristics are inherited and so are passed on to the next generation.

Deductions:

- A. All organisms are involved in a struggle for survival and only the best adapted survive.
- B. Organisms that survive are more likely to reproduce, and therefore pass on their useful adaptations to their offspring.

Observations



1. All organisms produce more offspring than survive to adulthood.

One of Darwin's first observations was that all living things are capable of producing more offspring than are needed to replace their parents.

For example a female rabbit can produce up to seven kittens in a litter, but they don't all survive to become adults.



Observations



2. Populations remain more or less constant in numbers

Darwin's second observation was that the numbers of many different species of animals and plants tend to stay fairly constant over long periods of time.

For example, herds of many animals live on the plains of Africa, wildebeest, zebra, gazelles etc. Each year many of the females give birth to young, but the overall population sizes of these species stay the same.

There are a number of factors which keep the population numbers stable, including competition for food, predation and disease



Observations



3. Members of the same species show variation in characteristics.

Darwin's third observation was that all living things vary slightly in color, shape, size or behavior.

Below are three different colorings and skin patterns found in the giraffe.



West African giraffe



Reticulated giraffe



Thornicroft's giraffe

Observations



4. Some characteristics are inherited and so passed on to the next generation

Darwin's fourth observation was that many features are passed on from parent to offspring.

Some inherited characteristics are quite easy to see in humans:

Eye color

Hair color

Some are not so easy to see:

Blood group



Conclusions



From his four observations Darwin was able to deduce **two** main conclusions.

A. All organisms are involved in a struggle for survival.

B. Some individuals are better adapted to their environment than others.



Polar bears fighting



Pygmy seahorse camouflaged against fan coral

Survival of the fittest



The individuals that **are best adapted to their environment** are most likely to survive and have the chance to reproduce, therefore passing on their useful adaptations to the next generation.

Those individuals that are the least well adapted do not survive long enough to breed.

These ideas formed the basis of Darwin's theory of evolution by natural selection.

Male African lion



Silverback mountain gorilla

Evolution by natural selection



Darwin concluded that natural selection could explain how organisms gradually change and evolve into new species.

At the time of publishing Darwin found it difficult to get his theory accepted, as it was difficult to prove.

Other scientists at the time wanted Darwin to provide an explanation to how individuals passed on their characteristics to their offspring.

Since Darwin's time, advances in our understanding of genetics have provided evidence to support and extend Darwin's theory.