



# Biology Top-Up

## Variation & Classification

There are variations between all organisms on the planet - the differences between species are obvious; sometimes the variation within a species is less marked. All organisms of the same species are similar because they have the same genes. The variations occur because of the different alleles (different versions of the same gene e.g. blood type has A, B and O alleles) present.

Adaptations are characteristics that aid an organism's survival. Because the characteristics within a population vary, this means that some individuals are better adapted for survival. It is the combination of different alleles that an organism has that leads to these adaptations.

### Evolution & Natural Selection

Evolution is a gradual change in the characteristics of a population over a long period of time. The process which drives evolution is natural selection.

The theory of evolution by natural selection says that because all organisms of the same species are competing for the same resources, those that are better adapted are more likely to survive and reproduce. This means that the alleles that code for these adaptations will be passed on, and so over time the whole population changes to have those alleles. This cycle is continuous, with different adaptations being better suited to an ever-changing environment.

### Classification

This is a way of sorting organisms into different groups to make them easier to study. There have been many different ways of classifying animals - based on appearance (older systems), DNA, biological molecules present in the body, embryonic development etc. The system starts with large groups, and then splits to form smaller ones - there are *more* groups at each level of organisation but with *fewer* organisms in each.

Because the system is hierarchical (split into levels), each organism is known only by the last two names - the genus and the species. Two examples of this binomial classification are shown below.

Genus name	Species name	Common name
<i>Ursus</i>	<i>arctos</i>	Brown bear
<i>Ursus</i>	<i>maritimus</i>	Polar bear

Note: the genus and species name are **always** typed in *italics* or underlined if handwritten. The genus **always** starts with a capital letter, the species **never** does! These are conventions used all over the world.

