

## Definitions and Concepts for CAIE Biology IGCSE

### Topic 18: Variation and Selection

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*Definitions in **bold** are for supplement only*

**Adaptation** - The process by which populations over many generations become increasingly suited to their environment, as a result of natural selection.

**Adaptive feature** - An inherited feature of an organism that increases its chance of survival and reproduction in its environment.

**Adaptive feature** - An inherited functional feature that increases the fitness of an organism.

**Antibiotic-resistant bacteria** - Bacteria that mutate to become resistant to an antibiotic, survive and reproduce very rapidly, passing on their antibiotic resistance.

**Artificial selection** - See 'selective breeding'.

**Competition** - When different organisms compete for the same resources (e.g. light, water, mates) in an ecosystem. This limits population sizes and stimulates evolutionary change.

**Continuous variation** - A type of variation that cannot be categorised e.g. skin colour, height. It produces a continuous range in which a phenotype can take any value between two extremes. **It is affected by environmental conditions.**

**Discontinuous variation** - A type of variation that can be categorised e.g. blood group, tongue rolling. A characteristic can only appear in discrete values. **It is generally influenced by genes alone.**

**Evolution** - The gradual change in the adaptive features of a population over time. **Occurs due to natural selection.**

**Fitness** - The ability of an organism to survive and reproduce in its environment.

**Gene mutation** - A random change in the base sequence of DNA which may result in genetic variants. Mutations may be beneficial, damaging or neutral.

**Genetic variation** - Differences in the genotypes of organisms of the same species due to the presence of different alleles, arising through mutations and sexual reproduction. It creates variation in phenotypes.

**Hydrophytes** - Plants that are adapted to live and reproduce in very wet habitats e.g. water lilies.

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**Mutagen** - A chemical, biological or physical agent that increases the rate of gene mutations above normal level e.g. ionising radiation.

**Mutation** - A genetic change. Mutations may form new alleles.

**Natural selection** - The process by which the frequency of advantageous traits passed on in genes gradually increases in a population over time.

**Phenotypic variation** - Differences in the phenotypes of organisms of the same species.  
**Due to interactions of the genotype and the environment.**

**Population** - All organisms of the same species living with one another in a habitat.

**Selective breeding** - The process by which humans artificially select organisms with desirable characteristics and breed them to produce offspring with desirable phenotypes. Also known as artificial selection.

**Sickle cell anaemia** - A recessive genetic disorder caused by a change in the base sequence of the haemoglobin gene. This results in abnormal haemoglobin which distorts red blood cells.

**Sickle haemoglobin allele ( $Hb^S$ )** - A recessive allele of the haemoglobin gene. An individual that has inherited both recessive alleles ( $Hb^S Hb^S$ ) has sickle-cell anaemia. Heterozygous individuals ( $Hb^S Hb^A$ ) exhibit virtually no symptoms of anaemia and are resistant to malaria.

**Variation** - Differences between individuals of the same species.

**Xerophytes** - Plants that are adapted to live and reproduce in dry habitats where water availability is low e.g. cacti and marram grass.

