

## Definitions and Concepts for Edexcel Biology GCSE

### Topic 4: Natural Selection and Genetic Modification

Definitions in **bold** are for higher tier only

Definitions marked by '\*' are for separate sciences only

\***Alfred Russel Wallace** - A scientist that came up with the idea of natural selection, independently of Darwin. Although his proposed mechanism differed, his observations provided further evidence to support the theory.

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

**Archaea** - One of the three domains. It consists of primitive bacteria existing in extreme environments.

**Ardi** - A 4.4-million-year-old female hominid fossil that shows phenotypic traits encompassing characteristics of both humans and apes.

\***Bacillus thuringiensis (Bt)** - A soil-borne bacterium which secretes a toxin that kills insect larvae. The gene for toxin production in Bt can be introduced into the DNA of crop plants to provide insect resistance.

**Bacteria** - One of the three domains that consists of true bacteria.

\***Biological control** - The introduction of a new organism (often a predator) into an ecosystem to control a pest or pathogen.

**Carbon-14 dating** - Estimating the age of carbon-containing material that is found in or alongside archeological remains in order to determine their age.

**Charles Darwin** - The scientist who developed the theory of evolution by natural selection.

\***Classification** - The organisation of organisms into groups based on their characteristics and structure.

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

**Eukarya** - One of the three domains that consists of all eukaryotic organisms.

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**Evolution** - The gradual change in the inherited traits within a population over time. Occurs due to natural selection.

**\*Fertilisers** - Natural or artificial materials that are added to soils to provide essential nutrients and improve plant growth.

**Five kingdom classification system** - The classification of organisms into five major kingdoms: Animalia, Fungi, Plantae, Prokaryotae and Protoctista.

**Fossils** - The remains of dead organisms found in rocks which are millions of years old.

**Genetically modified (GM) organism** - An organism that has had its genome altered.

**Genetic engineering** - The modification of the genome of an organism by the insertion of a desired gene from another organism, enabling the formation of organisms with beneficial characteristics.

**Genome** - The complete genetic material of an organism.

**Ligase** - An enzyme that joins the sticky ends of the DNA and vector DNA forming recombinant DNA.

**Lucy** - A 3.2 million year old female hominid fossil exhibiting more human-like phenotypic traits than 'Ardi'.

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

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

**\*Pentadactyl limb** - A limb with five digits present in animals, birds, reptiles and amphibians. It provides evidence for the evolution of species from a common ancestor.

**Recombinant DNA** - A combination of DNA from two different organisms.

**Restriction enzymes** - Enzymes that cut DNA molecules at specific sequences, creating sticky ends.

**Richard Leakey** - A scientist that discovered many hominid fossils on an expedition to Kenya, including the 1.6-million-year-old fossil 'Turkana Boy' which showed traits comparable to that of modern-day humans.

**Selection pressures** - Environmental factors that drive evolution by natural selection and limit population size, e.g. competition, predation and disease.

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



**Sticky ends** - The staggered cut formed by restriction enzymes in double-stranded DNA.

**Stratigraphy** - Using the age of the layers of sediment surrounding archeological remains to estimate the age of the remains.

**Taxonomy** - The classification of organisms into taxa: kingdom, phylum, class, order, family, genus, species.

**Three-domain system** - A method of classification in which organisms are categorised into three groups: Archaea, Bacteria and Eukarya. Developed by Carl Woese.

\***Tissue culture** - A method of growing living tissue or cells in a suitable medium to produce clone plants.

**Vector** - A carrier used to transfer a gene from one organism to another.

