



6.2 VARIATION AND EVOLUTION

Change in inherited characteristics over time

Due to natural selection

Different habitats have different desirable qualities, so natural selection occurs differently

Phenotype determined by interaction between genotype and environment

Continuous process

Can lead to formation of new species

New species formed when organisms can no longer interbreed to produce fertile offspring

Mutations cause new characteristics

Mutations occur continuously but most do not result in a new phenotype

Selective breeding

Bacteria modified to produce insulin

Breed organisms with desirable qualities

Genes from other organisms can be added

Involves modifying an organism's genome to give it desirable characteristics

Risks: loss of biodiversity, GM crops are expensive, long-term health impacts unknown

Genetic engineering

Benefits: improve crop yield, produce materials for medicines, less waste

Process:
1. Desirable gene isolated using enzymes
2. Gene inserted into vector (usually bacterial plasmid/virus)
3. Gene transferred to target organism early in development

Variation

Evolution

Cloning

Produces offspring with identical genetic information to parent

GM crops are resistant to disease, can produce better fruit and are frost resistant

Used to preserve rare plants

Other cloning methods: tissue culture/cuttings (plants), embryo transplants (animals)

Cloning animals:
1. Remove nucleus from unfertilised egg cell
2. Replace with nucleus from adult body cell (e.g skin cell)
3. Give egg cell an electric shock – stimulates cell division
4. When embryo develops, place in womb of adult to develop

KEY
'Higher tier only' written in orange.
'Biology only' written in clouds.

AQA