

Section 1.7: Genetic Variation and Its Control

Variation

- That plants and animals have similar characteristics to their parents because an organism's characteristics are carried by genes, which are passed on from parents to their offspring in gametes.
 - That differences between organisms can be determined by their genes, their environment or both.
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Genes, Chromosomes and DNA

- That chromosomes are found in the cell nucleus and carry genes.
 - That genes control characteristics in an organism and that different genes control different characteristics.
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Reproduction

- That sexual reproduction involves the fusion of male and female gametes (e.g. sperm and egg cells) from two parents and creates offspring which contain a mixture of their parents' genes.
 - That asexual reproduction involves no fusion of gametes, only one parent and no mixing of genes which creates offspring that are genetically identical to the parent (clones).
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Cloning

- That plants can be cloned using cuttings and that this allows plants to be produced quickly and cheaply.
 - That plants can also be cloned through tissue culture (a method of producing whole plants from plant cells grown on a growth medium).
 - How cloned animals can be produced using embryo transplants — sperm is used to fertilise an egg, creating an embryo. The embryo is then split many times to produce clones before any cells become specialised. The cloned embryos are implanted into host mothers.
 - How animals can be cloned using adult cell cloning — a nucleus from an adult body cell is inserted into an 'empty' egg cell. The egg cell is then stimulated to divide by electric shock and the embryo is implanted into the uterus of a surrogate mother.
 - How to interpret information about cloning methods.
 - The issues surrounding cloning and how to make judgements about them.
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Genetic Engineering

- How genetic engineering works — enzymes are used to cut out useful genes from one organism's chromosome and then insert them into another's.
- That 'new' genes are often transferred into plants and animals at an early stage of their development, so that the plant or animal develops useful characteristics.
- How to interpret information about cloning methods.
- That GM (genetically modified) crops are examples of genetically engineered organisms and that some GM crops are resistant to insects or herbicides.
- The issues surrounding genetic engineering and how to make judgements about them.
- The issues surrounding GM crops, including: GM crops can increase yields; some people are concerned that they could negatively affect the weeds and insects that grow around GM crops; some people are concerned they could negatively affect human health.