

Section A: Vocabulary

Section B: DNA and Replication

Section C: Genetic Variation

Tier 3 Vocabulary

asexual reproduction	Producing new organisms from one parent only. These organisms are genetically identical to the parent.
sexual reproduction	Reproduction that needs a male and a female parent.
chromosome	A structure found in the nuclei of cells. Each chromosome contains one enormously long DNA molecule packed up with proteins.
diploid	A cell or nucleus that has two sets of chromosomes. In humans, almost all cells except the sperm and egg cells are diploid.
DNA	Deoxyribonucleic acid. A polymer made of sugar and phosphate groups joined to bases. One molecule of DNA is found in each chromosome.
gamete	A haploid cell used for sexual reproduction.
gene	Section of the long strand of DNA found in a chromosome, which often contains instructions for a protein.
genome	All the DNA in an organism. Each body cell contains a copy of the genome.
haploid	A cell or nucleus that has one set of chromosomes. Gametes are haploid.
meiosis	A form of cell division in which one parent cell produces four haploid daughter cells.
mitosis	A form of cell division in which one parent cell produces two diploid daughter cells.
zygote	Another term for 'fertilised egg cell'.
base (in DNA)	Four substances that help make up DNA, often shown by the letters A, C, G and T. Pairs of bases form 'links' between two 'spines' formed of phosphate groups and a type of sugar.
codon	A set of three bases (a triplet) found in DNA and RNA. The genetic code is formed from patterns of codons.

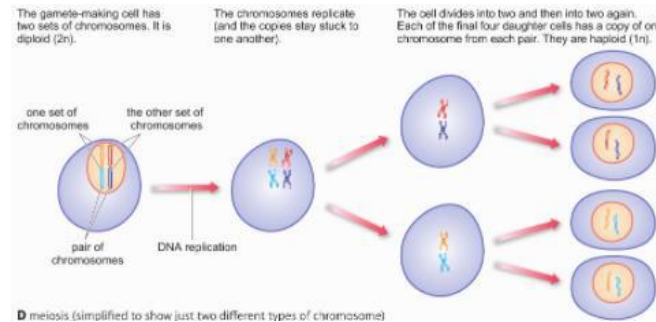
Sexual and Asexual Reproduction

Most animals and plants reproduce by **sexual reproduction**, involving **fertilisation** of a female sex cell by a male sex cell. Some organisms can reproduce without fertilisation, which is known as **asexual reproduction**. This produces **clones** (offspring that are genetically identical to the parent).

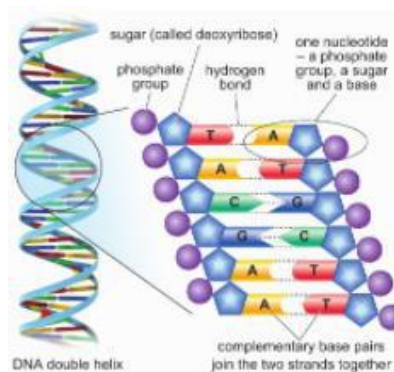


B In the summer, an adult female aphid can produce up to five young a day without the need for a mate.

Meiosis



DNA



Higher

Mutations

A change in the bases of a gene creates a genetic variant or **mutation**. It can be caused when DNA is not copied properly in cell division. Environmental factors can also cause mutations. Some mutations change an organism's **phenotype** (observable characteristics).

Mutations are the reason that genes exist in different forms, called **alleles**. One gene can have many alleles, caused by different mutations. Your characteristics are shaped by the alleles you inherit.

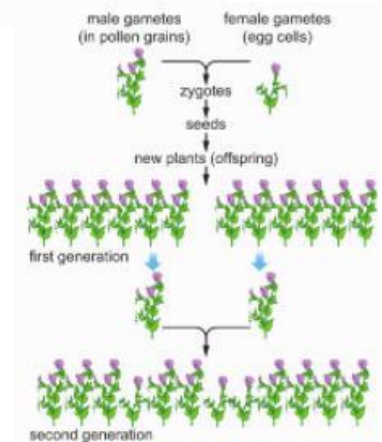
Mutations in non-coding DNA

RNA polymerase attaches to DNA bases in front of a gene. A mutation in this non-coding region may result in RNA polymerase not binding well, reducing transcription. Such a mutation can cause β -thalassaemia, in which not enough β -polypeptide is made for haemoglobin. This causes tiredness, weakness and shortness of breath.

Mendel

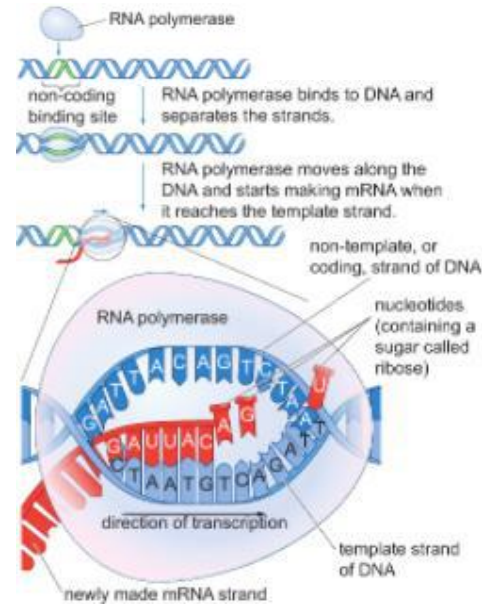
Diagram C shows one of Mendel's experiments. The first generation contained only tall plants, but when he crossed two of these he got some short plants again.

After many such experiments, Mendel concluded that inherited 'factors' control the variation of characteristics. These factors exist in different versions (now called 'alleles') that do not change. A plant has two factors for each characteristic, which are either the same version or two different versions.

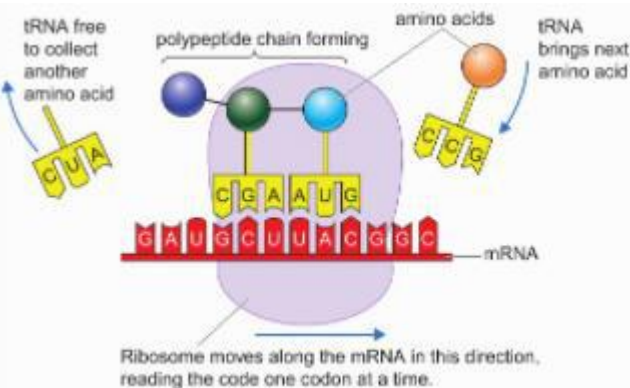


messenger RNA (mRNA)	A single strand of RNA produced in transcription.
polypeptide	A chain of amino acids.
ribosome	A protein that attaches to mRNA. It allows transfer RNA (tRNA) molecules to match up with the mRNA codons and also joins the amino acids together.
RNA	Abbreviation of ribonucleic acid. The molecule is made of phosphate groups and sugars (called ribose) linked together with one of four bases.
RNA polymerase	An enzyme that creates mRNA from DNA.
template strand	The strand of a DNA molecule that RNA polymerase uses to make mRNA.
transcription	The process by which the genetic code in one strand of DNA molecules is used to make mRNA.
transfer RNA (tRNA)	A molecule of RNA that carries an amino acid.
translation	The process by which the genetic code in a molecule of mRNA is used to make a polypeptide.
allele	Most genes come in different versions called alleles. So a gene for eye colour may have one version (allele) that can cause dark eyes, and another allele that can cause pale eyes.
phenotype	The characteristics that a certain set of alleles display.
allele	Most genes come in different versions, called alleles. So a gene for eye colour may have a version (allele) that can cause dark eyes and an allele that can cause pale eyes.
dominant	Allele that will always affect the phenotype (as opposed to a recessive allele, whose effect will not be seen if a dominant allele is present).

Higher Transcription

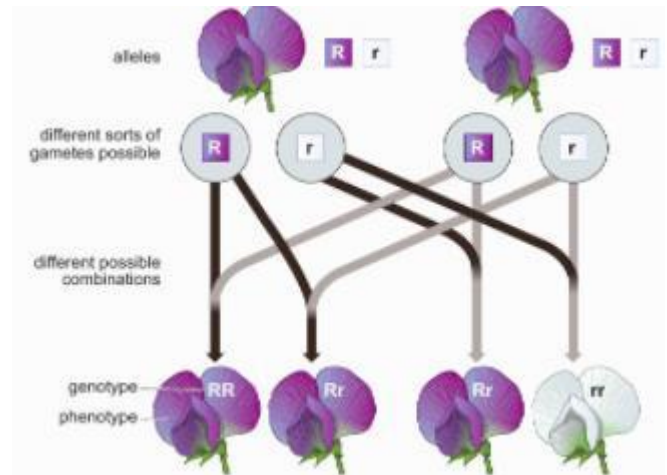
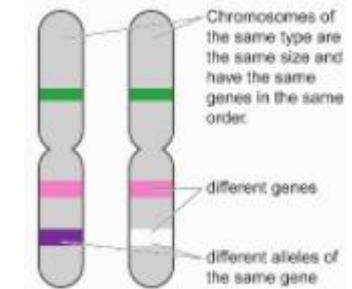


Translation



Once chromosomes were discovered (in the 1880s), scientists began to see how Mendel's factors could work. His ideas started to be accepted in the 1900s and the word 'gene' was coined in 1909.

Alleles



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Sex-Linked Genetic Disorders

