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D1.2 Protein synthesis

Checklist

What you should know

After studying this subtopic you should be able to:

- Describe transcription as the synthesis of RNA using DNA as a template.
- Describe the use of hydrogen bonding and complementary base pairing in transcription and the replacement of thymine with uracil in RNA.
- Describe how DNA is used as a template for transcription, remains stable and unchanged.
- Explain the use of transcription and its control of gene expression.
- Describe translation as the use of the mRNA produced in transcription to synthesise polypeptides.
- Describe the roles of mRNA, ribosomes and tRNA in translation.
- Describe complementary base pairing between the codons on mRNA and the anticodons on tRNA.
- Explain the main features of degeneracy and universality of the genetic code.
- Deduce the sequence of amino acids from an mRNA strand using a table of mRNA codons.
- Describe the elongation process of translation.
- Describe how a point mutation can affect the polypeptide produced.

Higher level (HL)

- Describe the directionality of transcription and translation as 5' to 3'.
- Describe the role of the promoter in transcription and how the binding of transcription factors to the promoter initiate transcription.
- Explain the roles of non-coding regions of DNA.
- Explain post-transcriptional modification of mRNA in eukaryotes.
- Describe how alternative splicing can produce variants of a protein.
- Describe the initiation stage of translation.
- Describe the modification of polypeptides to their functional state using pre-proinsulin to insulin as an example.

- Describe the recycling of amino acids by proteasomes.