Transcription

The DNA molecule is too large to leave the nucleus, so a smaller messenger molecule is made called (mRNA). The double stranded DNA molecule is unwound and split by RNA polymerase, which breaks the hydrogen bonds holding them together. This exposes the sequence of bases in the gene. The coding strand carries the genetic code and the complementary strand is a non-coding strand, which is used to build a copy of the coding strand called (mRNA). It has an identical sequence of bases to the coding strand, except thymine is replaced by uracil. Each triplet of bases on the (mRNA) is called a codon. The enzyme RNA polymerase joins the bases of the RNA to produce a complete single stranded molecule. The molecule of (mRNA) detaches from the DNA template and the DNA strands can re-join to make the double helix. The (mRNA) leaves the nucleus via the nuclear pores and into the cytoplasm.

Translation

Translation is the conversion of the genetic code to a sequence of amino acids. The mRNA joins on to a ribosome in the cytoplasm. The ribosome contains enough space for two codons at a time. The mrna slides through the groove between the two components of the ribosome. As each codon enters the ribosome, it is used to position the next amino acid. Amino acids must be activated – they are combined with a specific molecule of trna that has a specific base triplet called the anticodon. The anticodon of the trna is complementary to a codon on the mrna. ATP is used in this activation process. The amino acids attached to trna molecules are aligned with the correct part of the mrna by the complementary pairing of the bases in the codon and the anticodon. Enzymes bind the amino acids together in a chain by condensation reactions to create a growing polypeptide chain. The trna molecule is then released to be re-used. When the ribosome reaches the end of the mrna, the complete polypeptide chain is released and folds to form the secondary and tertiary structure of the protein. Some proteins need to be activated by cyclic AMP.