Reaction between valine and serine

Science, Biology

A DNA (deoxyribonucleic acid) is composed of 4 different bases; adenine (A), guanine (G), cytosine (C) and thymine (T). Applying these 4 bases it may contain thousands of sequences within a single strand. Each of these bases makes a specific pairing with a corresponding base whereby the double helix structure is synthesised. This interaction is called base-paring and the complementary base pairs are; T pairs only with A and C only with G. Through this simple coding language, the DNA carries and represents its vast genetic information.

Through a process called transcription, the genetic information of DNA is copied to form an intermediary molecule termed ribonucleic acid (RNA/messenger RNA). This formation is synthesised in the same way as DNA replication. However this process occurs only on one DNA strand called template strand. Thus the mRNA is only a single strand with 4 bases; adenine (A), guanine (G), cytosine (C) and uracil (U). The base-pairing rules are,

DNAmRNA

GC

CG

TA

AU

This will be synthesised through enzyme RNA polymerase and happens in the nucleus of the cell.

This transcribed mRNA consist the genetic code, which is used to generate proteins in the following process called translation. This code is comprised of

triplets that specifies an amino acid (e. g. AUG for methionine) and named as codon. These codons are recognised by transfer RNA. T-RNA can bind specific amino acid on one side by means of enzymes and has got an anticodon consists of triplets on the other side.

Each amino acid has got its own tRNA. The 1st mRNA codon will be always AUG, the start codon. Once the 2nd amino acid is bound to the 1st one, the 1st tRNA will be released and the 3rd one follows. This process is repeated until the so-called stop-codon in the mRNA terminates the growing protein synthesis. The completed protein is then released and takes its own characteristic shape. This process occurs in the cytosol of the cell.

The four-character language of DNA/mRNA can be converted into 20-character language of protein. However there are 64 combinations of mRNA codons as there are 4 possibilities for the 1st codon and 4 for the 2nd and 4 for the 3rd (4 x 4 x 4 = 64). Certainly there are many codons for many amino acids; however some are not, for instant stop-/start codons.