

DNA, Genes, Chromosomes

Eukaryotic DNA is associated with proteins called histones. Together, these form chromatin which make chromosomes.

Genetic Code – Sequences of bases along an organism's DNA. Genetic code is almost universal – the same sequence of bases code for the same amino acids in all organisms.

Triplet Code

Degenerate – each amino acid is coded for by more than one triplet. Three bases = 1 amino acid

AUGAUUACUCCUGAAUGA - Triplet codes

Exit ticket – A change in the sequence of bases on a DNA molecule can result in a non-functional enzyme as the change causes a change in the secondary structure and then the tertiary structure of the enzyme. This change of tertiary structure changes the active site shape resulting into no ES complexes being formed.

New Genome and Proteome

Point Mutations

Substitution – As DNA is replicated, one nucleotide may be exchanged for another. This can happen if a base is paired wrongly, due to radiation damage or chemical damage. When the gene containing the error is replicated, at least one copy will retain the error. The incorrect base will be paired with its complementary nucleotide to complete the mutation. A substitution usually only a minor mutation as the primary structure of the protein which the gene codes for is only changed slightly, if at all. The mutation only affects a maximum of one amino acid.

Insertion – As DNA is replicated, the DNA polymerase slips on a repeating base or sequence of bases. This causes it to add one or more extra nucleotides to the new strand. When the gene containing the error is next replicated, the extra base is matched with its complementary base to form a new base pair. The extra base pair has a knock-on effect on the base triplets along the rest of the strand. The primary structure of the gene's protein will be changed, which may be fatal.

Deletion – As DNA is replicated, the DNA Polymerase 'slips', overlooking a repeating base or sequence of bases. This causes it to miss out one or more nucleotides in the new strand. When the gene containing the error is next replicated, one of the daughter strands will be missing one or more base pairs. The missing base pair has a knock-on effect on the base pair triplets along the rest of the strand. The primary structure of the gene's protein will be changed, which may be fatal.

Types of Mutations

Substitutions

Nonsense – this type of mutation results in a stop codon being coded for. This will prevent the rest of the polypeptide chain being coded.

Missense – this type of mutation results in a different amino acid being coded for. This could affect the structure and function of the polypeptide chain.

Silent – this type of mutation results in the same amino acid being coded for, as the genetic code is degenerate. There is no change in the polypeptide chain produced.