

## ① Fine structure of gene.

- A gene is a segment of DNA that specifies the sequence of amino acids in a polypeptide chain.

- Chemically gene is made of DNA.  
It is located inside the chromosomes or extra-chromosomal DNA.

- DNA is made up of two polynucleotide chains. The two chains are helically coiled.

- Each polynucleotide chain consists of a series of units called nucleotides.

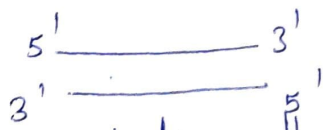
- In a DNA, there are 4 types of nucleotides, namely

①. Adenylic acid (A)      ③. Thymidylic acid (T)

②. Guanylic acid (G)      ④. Cytidylic acid (C)

- The four nucleotides are repeatedly arranged in a polynucleotide chain in a linear fashion.

- The two chains are arranged in an antiparallel manner. That is, the 5' end of one chain lies close to the 3' end of the other chain.



Antiparallel arrangement of two polynucleotide chains of a DNA.

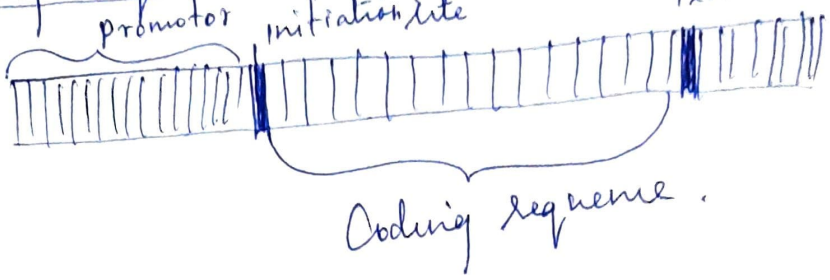
A gene represents a segment of one polynucleotide chain in the duplex DNA.

It is transcribed into an mRNA that is in turn translated into a protein. The protein is the product of expression of the gene.

Each amino acid is specified by 3 nucleotides of the gene. These three nucleotides of a gene are called a Codon or triplet code.

(2)

The gene consists of four main regions, namely promotor, initiation site, coding sequence and termination site.



- The promotor is at one end of the gene. RNA polymerase is attached to this region during RNA synthesis.

- The promotor sequence called pribnow box in prokaryotes and Agness box in eukaryotes.

- The initiation site is located next to the promotor. The mRNA synthesis begins from this site.

- The coding sequence is the middle segment of the gene. All these nucleotides are copied into mRNA.

- The termination site is at the other end of the gene. Here the mRNA synthesis is stopped.

Cistron: A gene coding a single polypeptide chain is called a Cistron. A protein containing two polypeptide chains is coded by two cistrons.

Muton: A gene may undergo change. This change is called mutation. Mutation may occur in a nucleotide of a gene or in a set of nucleotides. The unit of gene undergoing change is called a muton. It is smaller unit than a cistron.

- The mutation may be a single nucleotide or a set of nucleotides. The mutation leads to a changed expression of the gene.

Recon:- is the unit of gene beyond which recombination does not occur.

One gene one enzyme hypothesis says that each enzyme is synthesized by a specific gene.

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