Transcription

Definition :-- The process of formation of m-RNA on DNA strand with the help of enzyme DNA dependent RNA polymerase is called Transcription.

The process completes in nucleus of the cell. (prokaryotes = cytoplasm).

It occurs during G1 and G2 phase of cell cycle.

It involves three stages initiation, elongation and termination.

Requirements :-- Each segment of DNA which is to b transcribed is called Transcription unit.

It has following components:-

A) **Promotor :**-- Located at 5' end of DNA. Also called as upstream end,

It is a DNA sequence that provide binding site for enzyme RNA polymerase.

B **) Structural gene** :-- it is actual coding strand. The information of this strand is copied on m-RNA.

C **) Terminator** :-- Located at 3' end of DNA. Also called as downstream end.

It defines the end of transcription process.

D) **Initiation factor**: initiate process . it is sigma factor.

E) **Termination Factor** :-- Terminate the process ,It is ''Rho"'

F) **RNA polymerase enzyme. :- Three types**

I] RNA polymerase I : Used in synthesis of r – RNA.

II] RNA polymerase II : Used in synthesis of m-RNA.

III] RNA polymerase III: - Used in synthesis of t – RNA.

Process:---

1] RNA pol II binds at promoter region.

2] Two strands of DNA get separated and form transcription bubble.

3] The strand on which m -RNA is formed is called template/ antisense strand/ non coding strand. Other strand is called sense strand/coding strand.

(Nucleotide sequence of coding strand is similar to sequence on m-RNA).

4] sigma factor is activated and process starts.

5] During elongation RNA POLII enzyme moves along the length of structural gene and decode message from DNA.

6] At terminator end Rho factor is activated and process stops. DNA strand and m-RNA get separated.

7] This m-RNA is non functional and undergoes processing called maturation.

Processing of hn RNA.

It is completed in three steps splicing, capping and tailing.

Splicing:-- Non functional RNA contains exons and introns both. Exon is functional while intron is non functional.

Removal of intron is called splicing. Exons are joined by enzyme DNA ligase.

Capping:-- Addition of methylated guanosine tri phosphate at5’ end is capping.

Tailing :-- Addition of polyadynelate at 3’ end is called Tailing.

(Diagram from book Fig 4.12).

Some important terms:

- Monocistronic.
- Polycistronic.
- Coding strand.
- Non coding strand.