

Functional structure of a Gene

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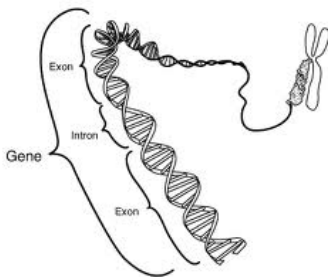
Structure of Gene



All genes have regulatory regions along with coding regions for RNA product. It is shared by all genes.

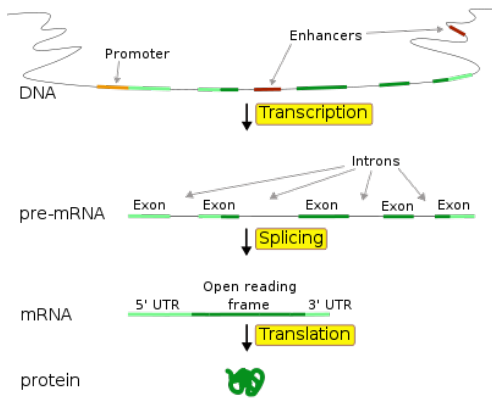
The promoter region provides a position recognized by the transcription machinery, where the gene undergoes transcription and expresses.

More than one promoter may be present in a gene. This results with RNA which extends towards the 5' region. The consensus sequence of a promoter is the common sequence. "strong" promoters of the genes bind the transcription machinery well, and the rest may have "weak" promoters that bind poorly.



Lower rate of transcription is permitted by these weak promoters than the strong promoters.

Eukaryotic promoter regions are complex and difficult to identify than prokaryotic promoters.



Many prokaryotic genes are organized into operons and are transcribed as a unit.

But in eukaryotic genes are transcribed only once. They may include introns, the long stretches of DNA. These are transcribed but never translated into protein. Splicing occurs in prokaryotic genes but it is not common in eukaryotes.

What are promoters?

A promoter is a regulatory region of DNA located towards the 5' region of a gene and provides a control point for regulated gene transcription.

It contains specific DNA sequences recognized by transcription factors, which bind to the promoter sequences, recruiting RNA polymerase, the enzyme that synthesizes the RNA from the coding region of the gene.

PROMOTER ELEMENTS

1. **Core promoter** – It is the minimal portion of the promoter important to initiate transcription

- Transcription Start Site (TSS)
- Approximately -34
- A binding site for RNA polymerase
- General transcription factor binding sites

2. **Proximal promoter** - It is the proximal sequence upstream of the gene that tends to contain primary regulatory elements

- Approximately -250
- Specific transcription factor binding sites

Difference between Eukaryotic and Prokaryotic Promoters

Prokaryotic promoters

In prokaryotes, the promoter consists of two short sequences at -10 and -35 positions upstream from the transcription start site.

Eukaryotic promoters

Eukaryotic promoters are diverse and we cannot characterize. The transcriptional complex can cause the DNA bend and place the regulatory sequences far from the actual site of transcription

What is alternate splicing?

Alternative splicing is a process that occurs in eukaryotes only. The given transcript of pre-mRNA transcribed from one gene can be cut and rejoin in many ways results with new mRNA sequences and then exit the nucleus to be translated in the cytoplasm.

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