Transcription



THE CENTRAL DOGMA OF MOLECULAR BIOLOGY

All cells contain a complete genome, that is, the DNA that encodes all the proteins a given organism can ever make. Transcription is the ordel otion of RNA from this DNA. Translation is the production of proteins it or some of the transcribed RNA, specifically the messenger RIP, DRNA). Such mRNA sequences are also referred to as "transcripts.

How should a Gription be regulated?

The put har remove comprises approximately 30,000–40,000 genes; a given cell may require expression of a smar proportion of these. Thus, many or even most of the genes may not be required to be expressed at a given time in a given cell. *Many genes in the genome are not expressed at a given time.*

How then should the genome be regulated? Should all the genes be constitutively expressed, with expression of many genes being inhibited by some process or mechanism? Alternatively, should expression of all the genes be constitutively prevented, with those that are necessary being specifically activated? What are the implications of these two proposed mechanisms?

In the eukaryotic genome, most genes are "off" and are switched "on" when needed.

Regulation of gene expression in prokaryotes is largely *negative,* that is, the genes are "available" for expression but represser molecules switch off genes that are not required for expression. Furthermore, in a single cell organism, with no tissue specialisation, more of the genes of the genome will be required to be expressed.

In prokaryotic genomes, most genes are "on" and are turned "off" when not needed.

NOMENCLATURE

Sites on DNA are classified by their position in relation to genes and transcription start sites. Thus, the "promoter" is the region immediately in front of the transcription start site. This is, therefore, said to be "upstream of" or "5' to" the start site.