Bio 11

Replication, transcription, and translation

History of the genetic molecule

- Is it protein?
- Griffith and his mice
- Avery's experiments
- Hersey-Chase
- Chargaff's rules
- Watson and Crick
- Meselson and Stahl

Watson and Crick with their DNA model



Rosalind Franklin



Meselson and Stahl Experiment







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Eukaryotic Replication

















Transcription in Prokaryotes

Central Dogma







Differences between RNA and DNA

- DNA uses GATC
- RNA uses GAUC
- RNA is temporary copy of DNA
- Made by RNA polymerase
- RNA is single stranded, DNA is double stranded.

Basic steps of transcription











Operons

- Half of the genes in E. coli are grouped into operons.
- We will look at two- lac and trp
- Operons have a promoter, operator and structural genes.





Lac operon

- Three genes controlled by this operon, transcription is polycistronic.
- Repressor is made at a second site regulated by another promoter.
- When lactose is not present transcription is repressed.
- Repressor will bind to operator blocking RNA polymerase.



Low Glucose

- Glucose is the preferred media, when glucose is present lactose is repressed.
- In the presence of plenty of glucose there is a lot of ATP. As ATP is reduced in the cell the level of cAMP increases. This increases the level of transcription.
- High glucose this inducer is absent.




Trp operon

- Trp operon has five genes.
- trp is repressed by the repressor in conditions were trp is in high concentration.
- Trp does not bind well in low concentrations. Turns the operator on.
- Repressor also transcribed from another place.

Operator- synthesis of tryptophan





Eukaryotic Transcription

















Primary mRNA transcript snRNP snRNP. 5' Exen Intrus 3' Evon 5' Splice site 3' Splice site A spliceosome forms because of interactions between snRNPs and other proteins, A cut is made between the 5' exon and the intron. - 6 61 After the first cut at the 5' end, the intron The free 3' OH group at forms a closed loop, like a lariat. This is the end of the just-cut done to avoid any reactions on the 5' end of exon reacts with the 5' the intron if it was allowed to remain free. phosphate of the second exon, splitting off the intron and joining the two exons. 0 The 3' exon is cleaved and spliced to the 5' exon. Mature mRNA 5' Exon 3' Exon 01 The excised intron is later degraded Translation in the nucleus. Protein







Translation





Codons



Second base of RNA codon



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BioFlix Protein Synthesis



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