Impact of Environment on Gene Expression And Nucleosomes regulating transcription 6/11/2016 7:51:00 PM

The environment of a cell and of an organism has an impact on gene expression

There is a 'nature-nurture' debate; to what extent is a particular human behavior or phenotype attributed to heredity or environment

Environmental factors can affect gene expression such as skin pigmentation during heavy exposure to sunlight

In embryo development, the embryo contains an uneven distribution of chemicals called morphogens

The concentrations affect gene expression contributing to different patterns of gene expression and thus different fates of the embryonic cells depending on their position in the embryo

Nucleosomes help to regulate transcription in eukaryotes

Eukaryotic DNA is associated with proteins called histones; modification of the tails of these histones is an important factor in determining whether a gene will be expressed or not

Acetyl groups, methyl groups, or phosphate groups can be added to the tails of histones

Residues of amino acid lysine on histone tails can have acetyl groups removed or added; the lysine on histone tails bear positive charges that

Transcription occurs in a 5’ to 3’ direction

Synthesis of mRNA occurs in three stages

- Initiation
- Elongation
- Termination

Begins in a site called promoter

Once binding of the RNA polymerase occurs, the DNA is unwound by the RNA polymerase forming an open complex

It slides along replicated a single strand of RNA

Eukaryotic cells modify mRNA after transcription

The regulation of gene expression can occur at several points, transcription, translation, and post translational regulation occur in both eukaryotes and prokaryotes

Most regulation of prokaryotic gene expression occurs at transcription; post transcriptional modification of RNA is something that doesn’t occur in prokaryotes

In prokaryotes, the genetic material has no nuclear membrane, thus it allows for the coupling of transcription and translation

In eukaryotes, the compartmentalization allows for post transcriptional modification to occur before the transcript exits the nucleus

- Intervening sequences, introns, are removed from the RNA transcript (prokaryotic DNA doesn’t’ have introns)

Immediate product of mRNA transcription is called pre-mRNA since it must go through modification to become mature mRNA

One of them is called RNA splicing; within the mRNA are sequences that won’t contribute to polypeptide formation and are called introns

Identifying Polysomes

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Polysomes are visible in the electron microscope

They look like beads on a string and represent multiple ribosomes attached to a single mRNA molecule