

Gene Expression and RNA

- Central Dogma of Molecular biology depicts flow of genetic information
 - o DNA triplet sequence = genetic word
 - o RNA sequence of DNA (U replaces A) to make codon
 - o Amino acid sequence of protein
 - o Transcription: copying DNA to RNA
 - o Translation: copying RNA to protein
 - o Prokaryote:
 - Transcription moves up slope
 - Translation attacks it perpendicular
 - o Eukaryote:
 - Transcription occurs inside nucleus
 - RNA processing makes pre-mRNA
 - This goes to mRNA
 - Translation occurs in cytoplasm
 - 1. Synthesis of pre-mRNA in nucleus
 - 2. Movement of mRNA into cytoplasm via nuclear pore
 - 3. Synthesis of protein
 - o RNA is single stranded
 - o One enzyme per gene

- Transcription
 - o Occurs by enzyme RNA polymerase
 - o In bacteria sigma factor binds to promoter and initiates copying to make complimentary copy of ONE of 2 DNA strands
 - o RNA polymerase
 - Directed by DNA
 - Synthesis of RNA on DNA template
 - 3 core subunits:
 - alpha: assembly of enzyme
 - beta: chain initiation/elongation
 - beta prime: binds to DNA
 - omega: restore denature RNA
 - Core RNA polymerase can bind to DNA but has no specificity
 - **Sigma unit required for specificity to make holoenzyme**
 - o Watson/Sense Strand = Complimentary strand
 - o Crick/Antisense Strand = Coding Strand
 - o Transcription mRNA reads 3-5'
 - o Transcription mRNA **synthesizes 5-3 (starts at 3 end of DNA)**
 - o **3 END OF DNA = 5 END OF RNA**
 - o 1. Initiation
 - o 2. Termination

- o 3. Elongation
- o Sense strand = noncoding and nontemplate = RNA version
- o Anti sense strand = coding and template
 - **mRNA is compliment of anti - sense**
- o **Methionine is initiator codon**
 - **Cleaved during or after translation**
- Transcription factor needed to recognize DNA sequence
 - o Motifs help bind to major and minor grooves
 - o Helix, zinc, leucine
- Binds to promoter region
- Enhancer: short region of DNA that can bind proteins to inc. transcription of genes
 - o Non-coding DNA segment
 - o Help with survival
 - o Flies could not produce hairs
- Types of RNA
 - o T-RNA
 - Small,
 - Anticodon
 - Single strand w/ 2nd structure
 - 2nd structure = base pairing within a single stranded polynucleotide