

**What is the Central Dogma?** *That the flow of genetic information is from DNA to RNA to protein.*

*DNA---(transcription)----mRNA----(translation)---protein*

### Transcription

- 1) **DNA is transcribed into what?** *An mRNA molecule (messenger RNA).*
- 2) **Where does Transcription occur?** *Transcription occurs inside the nucleus*
- 3) **Does Transcription occur on both strands of the DNA molecule?** *Transcription occurs on only one strand of the double stranded DNA, although different genes can be located on either DNA strand.*
- 4) **Does Transcription require a primer?** *Transcription does not require an RNA primer, but RNA polymerase is required to catalyze the production of mRNA*
- 5) **What enzyme joins the RNA nucleotides together?** *RNA polymerase joins the RNA nucleotides together*
- 6) **Where does the mRNA molecule go after Transcription?** *After transcription, the mRNA molecule is transported outside of the nucleus into the cytoplasm*

### mRNA editing

**Which types of cells, Prokaryotes or Eukaryotes, edit their mRNA and why?** *Eukaryotes edit their mRNA because the mRNA transcript carries excess RNA (Introns) that are not used to code for the final protein.*

**What are Introns?** *'Intervening sequences' that are edited out of the mature mRNA transcript*

**What are Exons?** *The 'expressed' parts of the mRNA that are kept and not edited out. Exons are pieced back together to form the complete mRNA molecule.*

### Translation

- 1) **Where in the cell does Translation occur?** *Occurs outside the nucleus in the cytoplasm*
- 2) **What is the actual site of Translation?** *Site of translation is the Ribosome*
- 3) **What is a ribosome made from?** *Ribosome is a complex of RNA and protein molecules*
- 4) **What is tRNA?** *Transfer RNA*
- 5) **What does tRNA do?** *tRNA carries amino acids to the Ribosomes*
- 6) **What is an Amino acid?** *One of twenty different molecules that form proteins. Like DNA, the sequence of amino acids is important in determining what protein is formed.*

- 7) **What is a Codon?** *The mRNA molecule is read by the ribosome in threes. Each group of three bases in the mRNA specifies a specific amino acid be put into the growing proteins chain*
- 8) **What is an Anticodon?** *Found on the tRNA molecule the anticodon is the complement of the mRNA triplet codon*

**Example of transcription and translation:**

**DNA:** TAC CAG CCA TGG AAA TCA TTT ACT

**mRNA:** AUG GUC GGU ACC UUU AGU AAA UGA

**Protein:** *Methionine - Valine - Glycine - Threonine - Phenylalanine - Serine - Lysine (don't count the stop codon)*

**Gene Regulation**

**What is a gene?** *A stretch of DNA with a start codon and a stop codon.*

**What does gene expression mean?** *It means that gene is transcribed, and then translated into a protein .*

**What is the Promoter?** *The Promoter is the region of DNA just upstream (5') from the start codon. This region is involved in binding or not binding the regulatory proteins.*

**What do the Positive regulatory proteins have that Negative regulatory proteins lack?** *Positive regulatory proteins have a shape that allows the RNA polymerase to bind to it and begin mRNA construction. Negative regulatory proteins lack this RNA polymerase site and prevent RNA polymerase from initiating an mRNA transcript.*

**Does one gene always make one complete protein?** *No, sometimes multiple genes are required to in order for the larger, more complex protein to be completed*

**Mutation**

**Effect of single nucleotide substitution on the final protein product?**

1)

2)

**What affect can a single base deletion or insertion have on the final protein product?**

**What is a Transposon (Jumping gene)?**

**What are some other things that can cause DNA mutations?**

**Can mutations that occur in your body cells be inherited?**