

Chapter 14: From DNA to Protein

The Central Dogma

- The description of how DNA is used to _____ proteins is referred to as “The Central _____”
- DNA is like _____ written in the alphabet of A, T, C, and G
- Simply knowing the letters does not tell us how the genes _____

- DNA consists of two strands of _____ twisted into a double helix
- A _____ is a linear stretch of one strand of nucleotides that is the code for making one _____
- The process of protein _____ consists of two main steps:
 - _____: DNA to RNA (_____)
 - _____: RNA to protein (_____)

RNA

- RNA carries out the _____ of protein synthesis
- RNA is made by copying a _____
- There are three types of RNA:
 - _____ RNA (rRNA) combines with _____ to form ribosomes
 - _____ RNA (mRNA) carries the genetic information to a ribosome
 - _____ RNA (tRNA) carries the correct _____ acid to the ribosome

Transcription

- Assembling _____ molecules:
 - RNA has _____ instead of deoxyribose
 - RNA has _____, but not thymine, as a base (____ & U can pair up)
 - RNA is _____
- Transcription looks similar to DNA _____, except for:
 - Only _____ of the DNA molecule is copied (only one _____)
 - _____ polymerase is used
 - Only a _____ strand of RNA forms

- Transcription begins when RNA polymerase attaches to the _____ region at the _____ of a gene
- Transcription is used to make any of the _____ types, however we will focus on _____ transcription
 - Only mRNA carries protein _____
- Transcription of mRNA creates a near-_____ of the gene, including “_____” regions
- The beginning of the mRNA is “_____” with a special _____ nucleotide
- A “_____ tail” of about 100-200 molecules of _____ acid is added to the _____ of the mRNA
- Non-coding regions of the mRNA (“_____”) are edited out, and the coding regions (“_____”) are spliced together
- mRNA then travels to a _____

Translation

- Both DNA and RNA are _____ sequences of _____
- Polypeptides are _____ sequences of _____
- Every sequence of _____ nitrogen bases (a “_____”)
specifies _____ specific amino acid
 - This is called the _____
- The genetic code is _____ for all eukaryotic chromosomes
- The Genetic Code:
 - Each base triplet in _____ is called a “_____”
 - The genetic code consists of _____ triplets that code for one of _____ different amino acids (there are some _____)
 - Three codons send the message to _____ protein synthesis (“_____”)
 - The codon _____, which specifies the amino acid _____, is the “_____ codon”
- Codon/_____ interactions:
 - Every _____ has a triplet sequence referred to as an “_____,” which is _____ to a codon
 - Every _____ carries one specific amino acid
 - Proper pairings of codons and anticodon ensure that the proper _____ of amino acids forms
 - The first _____ bases of the anticodon must be precise, however the _____ base can often vary (“_____ effect”)
- A _____ performs the actual assembly of the polypeptide, by translating the genetic code
- A ribosome has _____ subunits (each made of _____ and proteins)
- There are _____ locations in the ribosome where tRNAs can enter to temporarily bind with _____
- _____ of Translation:
 - _____ - the two ribosome subunits attach to the mRNA and a tRNA matches up to the _____ codon
 - Chain _____ - a series of tRNAs deliver their amino acids in sequence
 - _____ bonds link the amino acids
 - _____ - when the _____ codon is reached, the polypeptide is released into the _____ for completion
- One mRNA may be read by _____ ribosomes at the same time

Mutations

- A _____ mutation is a change to one or more _____
 - Bases may be added, deleted, or _____
- Mutations are _____ events that increase in frequency around certain _____, chemicals, and _____
- Mutations are most dangerous if they cause a “_____ _____,” by changing the _____ of triplets
- Deleting _____ bases is less harmful than _____