Lecture 4, Jan 19, 2023

Transfer RNA (tRNA) and Translation

- Translation is the process of building proteins
- tRNA forms tertiary structures
- tRNAs are about 4 times smaller than ribosomes (7nm vs 30nm) and they can interact
- The ribosome consists of RNA coiled together with proteins
- The ribosome reads a messenger RNA and makes proteins
  - Transfer RNAs have anticondons that match codons on the mRNA
  - Each tRNA has an amino acid which is used to build the final protein
- Every group of 3 bases form a *codon*; condon charts tell us which condon is formed by a combination of 3 bases
  - e.g. an AUG sequence forms a methionine, which is the "start" condon; UAA, UAG, and UGA are the "stop" codons
- The tRNA gets attached to the amino acid through other molecules
- The process:
  - Initiation: the AUG codon gets read, translation starts
  - Elongation: the next tRNA enters and grows the chain of amino acids; the previous tRNA gets ejected and a new one flies in and repeats
  - Termination: there is no amino acid attached to the tRNA with anticondon matching the "stop" codon, so the translation stops there; tRNAs are ejected and the protein is detached

Summary

Transcription and Translation: Summary

1. Aleration in chromatin structure (DNA uncoils)
2. Initiation of transcription by positive transcription factors and enchancers attracting DNA polymerase
3. Transcript elongation: the RNA is built one base at a time
4. Termination of transcription
5. RNA processing: introns are removed, leaving only the exons
6. Nucleocytoplasmic transport: RNA is transported out of the nucleus
7. Translation: protein is built from amino acids by ribosomes using tRNAs and mRNAs
8. RNA degradation