

PROBLEM SET #2 (lectures 17-18)

1. Understand the following terms involved in transcription and translation of the genetic code

aminoacyl tRNA	wobble	elongation factors
codon	reading frame	release factors
anticodon	peptide bond	amino acid
ribosome	P site	rRNA
initiation codon	A site	mRNA
stop codons	GTP	tRNA
puromycin	frameshift	inosine
RNA polymerase		

2. A portion of the DNA sequence encoding a particular gene has the sequence:

3' GGACCCTACAAACGCGGGGAACCACAAACA<sup>□</sup>TCGGG 5'

What is the sequence of the mRNA it encodes? What is the sequence of the polypeptide it encodes if an initiation codon is needed to begin polypeptide synthesis? What would the sequence be if the A (boxed) was mutated to a T?

3. A protein is found with the sequence Met-Thr-Trp-Phe-Lys-Cys-Arg-His-Pro-Gly. A mutant is found with the sequence Met-Thr-Trp-Phe-Lys. What are all of the possible mRNA sequences that could encode this protein. Assuming that the mutant resulted from a single base change in the DNA encoding the gene, what mutation took place at the DNA level and how did that affect the mRNA and protein sequence?
4. The mRNA for a particular protein is unusual in that it lacks any cytosine residues. What amino acids might it contain and which ones could it not possess?

5. Tryptophan is a relatively rare amino acid in proteins, can you think of one reason why?
6. Four different codons encode the amino acid glycine. Taking into account wobble rules, how many tRNAs are necessary for glycine and what might their anticodon sequences be?
7. A pathogenic bacterium is found that is newly resistant to puromycin. What is the likely cause of this resistance?
8. You've isolated the messenger RNA for one gene but don't know which strand of DNA serves as a template for transcription. How would you find out?