

Biology 121 Workshop 11: Protein Synthesis

This is the last “official” workshop. Feel free to convince your leader to have another to review for the final. They will only do this, however, if you agree to come armed with SPECIFIC questions you’d like the group to review. In other words, if you show up and say “Please go over Chapter 10 again,” your leader has the right to walk out the door. Looking over questions on exams which you got wrong and still don’t get would probably be a good starting point.

1. Make sure you understand and can explain the processes of transcription and translation. In small groups, fill out the table and then discuss as a group.

	Transcription	Translation
Template		
Location		
Molecules Involved		
Enzymes Involved		
Control-start and stop		
Product		
Product Processing		
Energy Source		

2. In groups of 2-3, use the protein synthesis model to illustrate the process of translation. Take turns explaining and showing what happens. (the strip labeled mRNA 1 is the “right” or wild type)

3. Define the following and explain what type of point mutation could cause each of these mutations.

a. silent mutation

b. missense mutation

c. nonsense mutation

d. frameshift mutation

The following 2 questions refer to your model.

4. Mutation by Base Phase-Shift Mutants

The mRNA 3 represents a mutation in the DNA segment that coded mRNA 1. The mRNA 3 was altered by a gene mutation that inserted base A (T in the DNA) in position number 8. Compare the polypeptide formed with mRNA 1, the wild type, and with mRNA 2, the mutant. Where does the shift in the amino acid occur? How could mRNA 3 be corrected so that the polypeptide product, except for one amino acid, is the same as with mRNA 1?

5. Mutation by Base Substitution

The mRNA 4 represents a conversion of base 4 in mRNA 1 from C to U, and of bases 14 and 15 from C to A. Synthesize the polypeptide products of mRNA 1 and mRNA 4. How do they compare? Do base substitutions necessarily result in an altered protein?

6. All the organisms on Planet Q have only ten different amino acids in their proteins. The genetic code (mRNA code) of all these organisms is:

		second base							
		U		C		A		G	
First Base	U	UU	Cys	UC	Ser	UA	Phe	UG	Leu
	C	CU	Leu	CC	Pro	CA	Lys	CG	Leu
	A	AU	Met	AC	Thr	AA	Lys	AG	Gly
	G	GU	Met	GC	Thr	GA	His	GG	Gly

a) How do the general features of this genetic code compare with those of the genetic code of earth organisms?

b) Give the mRNA sequence that will be transcribed from the DNA sequence AAGGTGACGA.

c) Give the amino acid sequence into which the mRNA produced by the DNA in (b) is translated.

d) Suppose the first G from the left is deleted from the DNA segment in (b): What will be the amino acid sequence produced by the mutant organism?

e) Describe two other types of mutations that can occur in the DNA of part (b) and their consequences