Self-Assessment Homework Questions for Mueckler Lectures

1. Describe the basis of the hydrophobic effect and how it influences the structure of membranes and proteins.

2. What is the minimum number of residues required for a polypeptide domain to completely traverse the fatty acyl core of the lipid bilayer as part of a beta sheet structure? Speculate on why two completely different types of protein secondary structure have evolved to form channels through membranes.

3. What would be the molecular and cellular consequences of adding to cultured mammalian cells a reagent that specifically inhibited the interaction between SRP and its receptor?

4. Using your knowledge of the secretory pathway, describe one way in which a cytoplasmic protein could be engineered to make it easier to purify in large quantities from cultured cells.

5. The first scientist to discover a “signal sequence” on a secreted protein subsequently won a nobel prize for a completely different discovery. Who was it? (Hint: it’s not the most obvious person.)

6. Summarize the characteristics of mitochondria that support the concept that they represent the remnants of an ancient bacterial “invasion” of a primitive eukaryotic cell.

7. Briefly outline a procedure to separate free polysomes from membrane bound polysomes starting with rat liver tissue.

8. Briefly outline an approach to identify a nuclear localization sequence in a novel protein that does not possess any of the currently recognized signals. How could you determine which karyopherin is involved in its translocation?

Note: none of your answers should require more than ~200 words.