Problem 3-3, cont.

Vesicles that are 'right side out' have the same orientation as whole cells – what is outside of the vesicle is what would be outside of the cell. These are NOT vesicles formed by RME.

Given all the recent results described on the previous page, what is the most reasonable structure for the glutamate receptor? The receptor probably has _____ transmembrane domains, _____ extracellular domains, the COOH end should be on the (inside) (outside) (either side) of the plasma membrane, and the amino end should be on the _____. Draw the membrane and show how the protein and all its parts fit in, and then explain how your model fits each of the results given.

3-4. Consider Protein P, the protein described in problem 1-17.

A. How can you tell (with out being told outright) from the information given, that the protein should be inserted in the membrane with its amino end on the outside of the plasma membrane?

B. Suppose you can make copies of the gene for peptide P (by genetic engineering) that lack the section(s) that code for domain A and/or C.

B-1. If you delete section A of the gene, the protein should end up (in the plasma membrane) (in the cytoplasm) (secreted) (in the ER or Golgi) (can't predict), AND

B-2. If you delete section C of the gene, the protein should end up (in the plasma membrane) (in the cytoplasm) (secreted) (in the ER or Golgi) (can't predict), AND

B-3. If you delete sections A and C of the gene, the protein should end up (in the plasma membrane) (in the cytoplasm) (secreted) (in the ER or Golgi) (can't predict).

C. Suppose protein P has carbohydrates attached to it, and the glycosylated protein is found in a vesicle inside the cell.

C-1. The carbohydrates should be found on the (outside) (inside) (either side) (both) of the vesicle, AND

C-2. The carbohydrates are most likely to be on section(s) (A) (B) (C) (D) (more than one of these) (can't predict), AND

C-3. The carboxyl end of protein P should be on the (outside) (inside) (either side) (both) of the vesicle.

D. You discover that protein P has a complex carbohydrate attached to it that contains (at least) two different sugars, S and T. In one experiment, you feed some cells a radioactive sugar that is a precursor to S; in a second experiment you use a radioactive precursor to T. At 5, 10, 15 .... minutes after adding each precursor, you take samples of the cells for autoradiography. After you wash (to remove unused precursor), fix, expose, and develop the samples, you count grains over the ER and the Golgi. You get the results shown below. (Note: Each graph shows the results of two separate experiments using different precursors.) In each graph, dashed line = precursor to S; solid line = precursor to T.

Given these results,

D-1. Sugar S is added in the (Golgi) (ER) (Both) (Golgi or ER & Golgi) (ER or ER & Golgi),

D-2. Sugar T is added in the _____ , AND

D-3. The first sugar added to each molecule of protein is (S) (T) (can't tell).