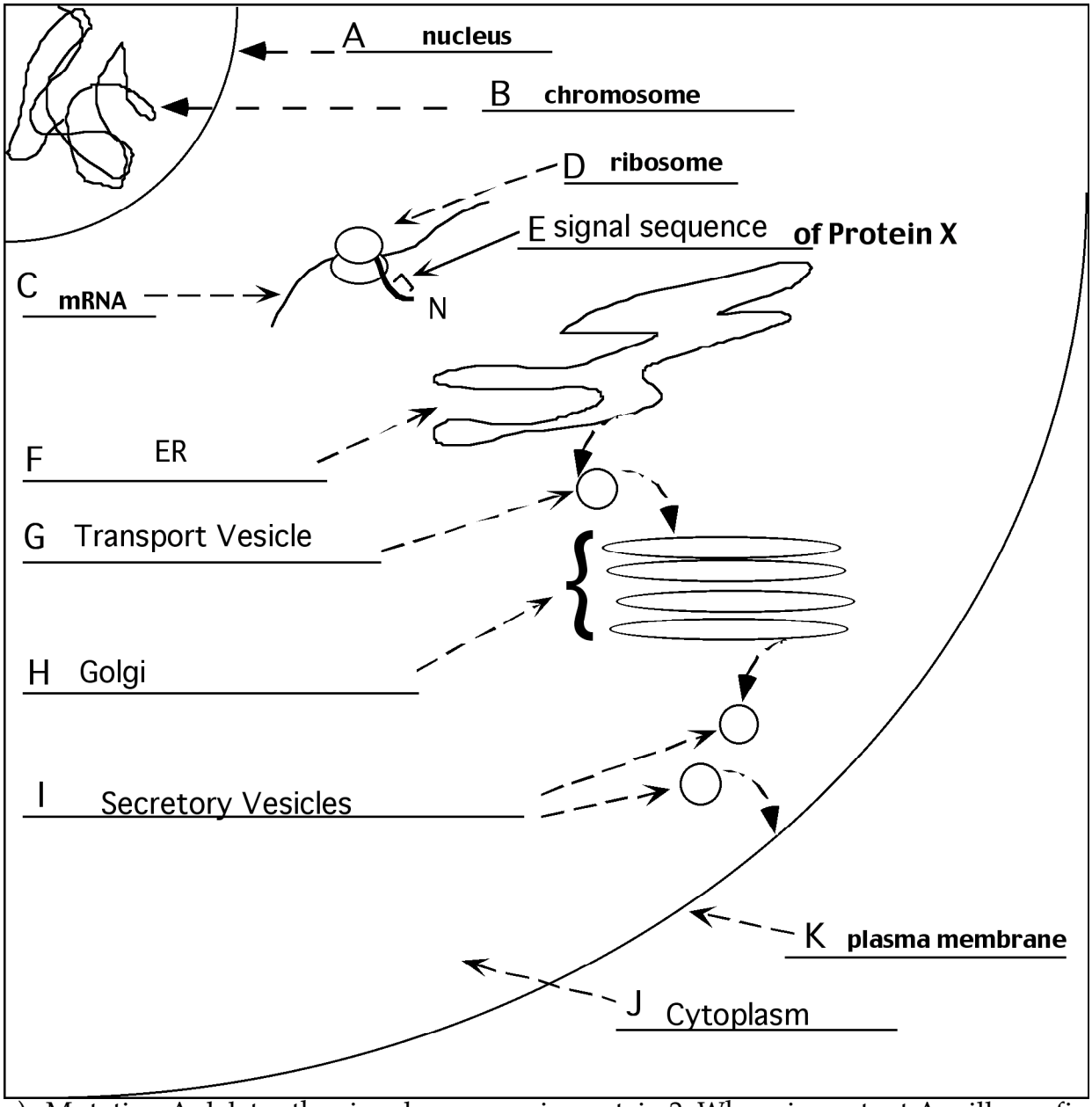
Solutions to 7.012 Protein Secretion Section Problem



a) Mutation A deletes the signal sequence in protein 2. Where in mutant A will you find

Protein 1?	Cytoplasm. Protein 1 is not affected by the mutation in Protein 2
Protein 2?	Cytoplasm. Protein 2 will not be directed for export without a signal sequence.
Protein 3?	Outside the cell. Protein 3 is not affected by Protein 2's missing signal sequence.
Protein 4?	Plasma Membrane. Protein 4 is not affected by Protein 2's missing signal sequence.

b) Mutation B inactivates the SRP. Where in mutant B would your find

Protein 1?	Cytoplasm. Protein 1 is not affected by the mutation.
Protein 2?	Cytoplasm. Without the SRP the protein won't be transported to the ER.
Protein 3?	Cytoplasm. Without the SRP the protein won't be transported to the ER.
Protein 4?	Cytoplasm. Without the SRP the protein won't be transported to the ER.

c) Mutation C deletes the transmembrane sequence in protein 4. Where in mutant C would you find

Protein 1? Cytoplasm. Protein 1 is not affected by the mutation in Protein 4

Protein 2? Outside the cell. Protein 2 is not affected by Protein 4's missing Transmembrane sequence.

Protein 3? Outside the cell. Protein 3 is not affected by Protein 4's missing signal sequence.

Protein 4? Outside the cell. Protein 4 will not be tethered in the membrane without a transmembrane domain.

d) Mutation D prevents the fusion of transport vesicles with the golgi membrane. Where would you find

Protein 1? Cytoplasm. Protein 1 is not affected by the mutation

Protein 2? In transport vesicles. If the secretion pathway is blocked at this fusion stage, all secreted and membrane proteins will be trapped in the transport vesicles.

Protein 3? In transport vesicles. If the secretion pathway is blocked at this fusion stage, all secreted and membrane proteins will be trapped in the transport vesicles.

Protein 4? In transport vesicles. If the secretion pathway is blocked at this fusion stage, all secreted and membrane proteins will be trapped in the transport vesicles.

e) Mutation E disrupts the SRP docking protein on the ER membrane. Where would you find.

Protein 1? Cytoplasm. Protein 1 is not affected by the mutation.

Protein 2? Cytoplasm. Without the docking protein SRP can't "dock" on the ER and any protein would remain in the cytoplasm. (Translation would actually cease.)

Protein 3? Cytoplasm. Without the docking protein SRP can't "dock" on the ER and any protein would remain in the cytoplasm. (Translation would actually cease.)

Protein 4? Cytoplasm. Without the docking protein SRP can't "dock" on the ER and any protein would remain in the cytoplasm. (Translation would actually cease.)

f) Mutation F results in a fusion of a signal sequence in frame before protein 1. Where would you find.

Protein 1? Outside the cell. With a signal sequence, Protein 1 will be directed for export.

Protein 2? Outside the cell. Protein 2 is not affected by Protein 1's signal sequence.

Protein 3? Outside the cell. Protein 3 is not affected by Protein 1's signal sequence.

Protein 4? Plasma Membrane. Protein 4 is not affected by Protein 1's signal sequence.