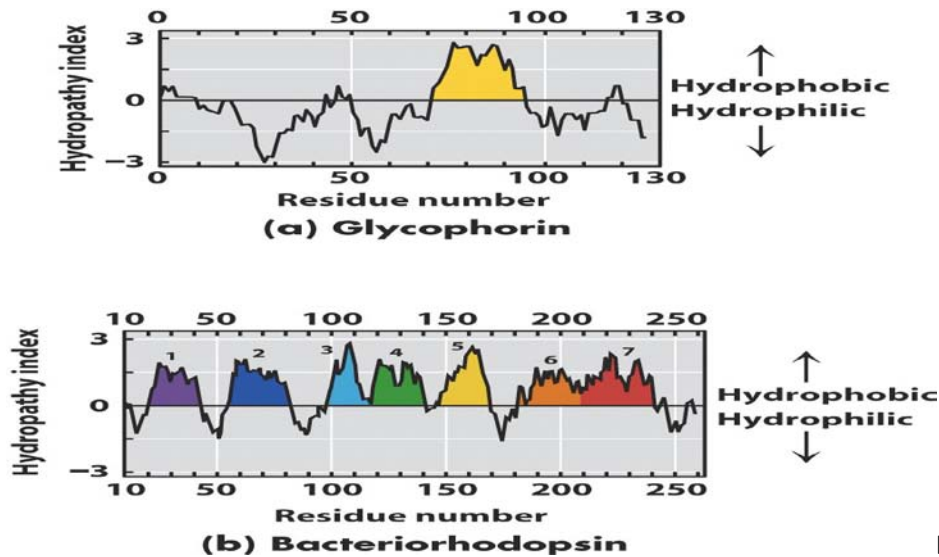


Hydropathy Plots Help Predict Protein Cellular Context

Objectives:

- Relate hydropathy plots to protein structure.
- Predict possible protein cellular compartmentalization from hydropathy plots.
- Draw a graphical representation of a concept.

Model 1



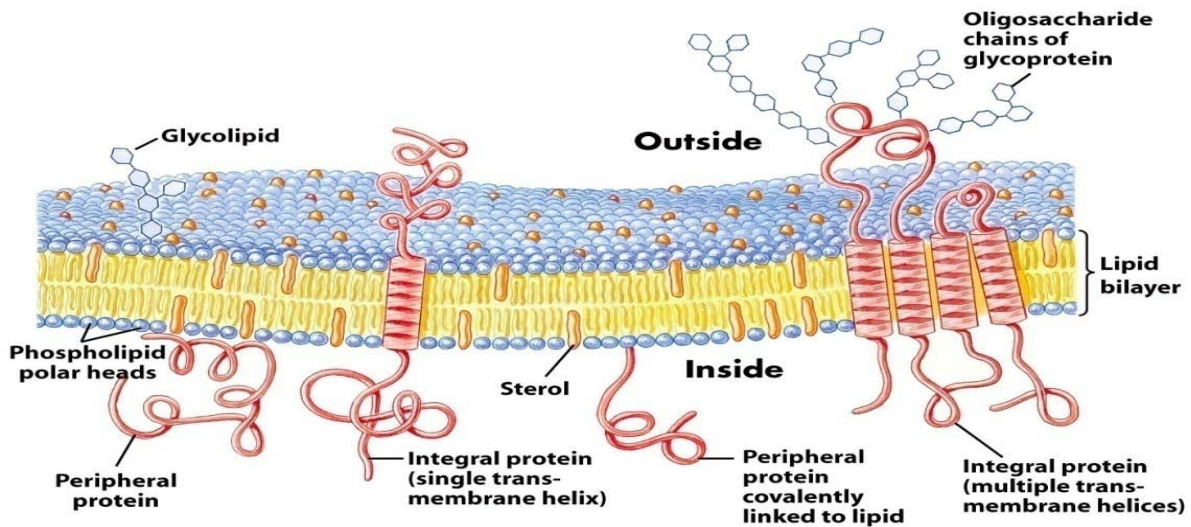
- The above plots in Model 1 are called hydropathy plots. What are the names of the proteins shown in these two plots?
- Sometimes biochemists call amino acids, "residues". How many amino acids are in the proteins in each of these plots?
- Noticing the Y-axis label and the words and arrows to the right of the plots, what does a +2 indicate on this plot? What does a -2 indicate on this plot?
- Each amino acid has a hydropathy index. Write a sentence that explains the hydropathy index for phenylalanine (F):

Amino acids sorted by increasing hydropathy index (based on previous table from Kyte and Doolittle)

| | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|
| R | K | N | D | Q | E | H | P | Y | W | S | T | G | A | M | C | F | L | V | I |
| -4.5 | -3.9 | -3.5 | -3.5 | -3.5 | -3.5 | -3.2 | -1.6 | -1.3 | -0.9 | -0.8 | -0.7 | -0.4 | 1.8 | 1.9 | 2.5 | 2.8 | 3.8 | 4.2 | 4.5 |

5. Some proteins traverse the cell membrane and are called transmembrane proteins. Given what you know about the structure and chemical nature of the cell membrane, choose 2 amino acids from the hydrophathy index above that would most likely populate:
 - a. The part of the protein that is in close contact with the inside of the cell membrane.
 - b. The part of the protein that is in close contact with the cytoplasm of the cell.
6. How many transmembrane domains do you expect glycophorin to have?
7. How many transmembrane domains do you expect bacteriorhodopsin to have?
8. On Model 2, circle the two proteins with transmembrane domains.

Model 2



9. Draw the plot you would expect to see for the transmembrane protein shown on the right hand side of Model 2.