Names: _____

The Waters lab studies a transporter in *E. coli* called Alx. Alx is only made when cells are grown in high pH media, where it imports H^+ to keep the intracellular pH ~ 7.

a) Draw a bacterial cell that has a cytoplasmic pH of 7 while growing in pH 10 media. Show:

- the membrane containing the Alx transporter
- the relative H^+ concentrations inside and outside of the cell
- the direction of H^+ transport

b) What type of transporter is Alx likely to be: passive or active? Why?

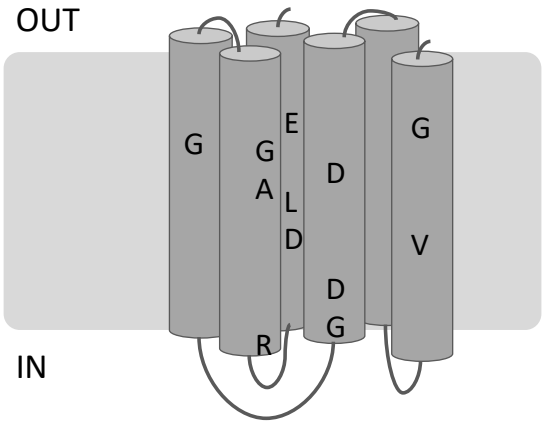
c) There is no ATPase domain present in Alx. Instead, Alx is a Mn^{2+} importer that requires high extracelluar Mn^{2+} for its activity. Add Mn^{2+} transport to the diagram above. Show:

- the relative Mn^{2+} concentrations inside and outside the cell
- the direction of Mn^{2+} transport

d) What powers the transport of H^+ through Alx? What is the name for this kind of transport?

(see other side)

From computational analysis using statistical scoring of amino acid sequences that are likely to form α-helices (no Pro, branched chain amino acids disfavored), we have developed a prediction of where the hydrophobic membrane-spanning regions of the protein are likely to be. There are likely to be 6 transmembrane regions with small loops in between, as shown in our model:



e) The most highly conserved amino acids in the Alx exporter are shown by their 1 letter code. Which amino acids might be directly involved in exporting H^+ and Mn^{2+}? (Circle them.) Why did you choose these?