

## Molecular Biology Through Discovery

### Problem Set 2: Strategies of Life

SL.1. Which of the following are hydrophobic? Hydrophilic? Amphipathic?

- |                |               |
|----------------|---------------|
| A. vinegar     | D. sugar      |
| B. skin        | E. wax        |
| C. tooth paste | F. rabid dogs |

SL.2. In general, hydrophilic molecules have a difficult time passing cell membranes unless the cell makes accommodations for them. Presuming there are no such accommodations, which of the following molecules would not easily get into a cell?

- |           |                |
|-----------|----------------|
| A. sodium | C. ethanol     |
| B. sugar  | D. amino acids |

*(The following problems require drawing. You might use Paint, PowerPoint or similar, or you can draw something and scan it somehow).*

SL.3. Consider that at an air-water interface, amphipathic molecules expose their hydrophobic surface to air. Draw a picture of what a soap bubble might look like at the molecular level, using a long-sticked popsicle to represent a molecule of soap.

SL.4. Some potent antiseptics are amphipathic molecules consisting of a long chain alkane on one end and a positively charged ammonium group on the other. How do you suppose they fit into a membrane? Draw a picture, labeled with approximate dimensions (in nanometers) of the membrane and the antiseptic. At the scale of your model, how big would a cell be?

SL.5. Phospholipase A2 is an enzyme commonly found in snake venom that acts by cutting off one of the two fatty acids on phospholipids. Draw a picture that shows how extensive action of the enzyme might detrimentally affect the structure of a cell membrane.