

TEACHER'S NOTES LESSON 5

Present these key points and questions to the students during the *Activities* section of Lesson 5, as your lecture/discussion. Make sure that as you are speaking, students are taking notes.

First, have one student chosen by the teacher write **hydrophobic** and **hydrophilic** on the board. Ask the class to determine what the root words and suffixes are.

hydro = root word

phobic and **philic** = suffixes

These words, their roots, and suffixes are to be recorded in students' vocabulary notebooks. Have the student at the board write the root words and suffixes as determined by the class. Ask if anyone can determine what the root and suffixes mean.

hydro = water

phobic = afraid of/dislike

philic = likes.

From these word parts can anyone determine what the words mean?

This is a great opportunity to discuss **educated guesses**. What is an educated guess? How do scientists use educated guesses? Tell students that part of their work this year will be to learn how to make EDUCATED guesses, not just guesses. Then, the student who wrote the words on the board will look up the words in the dictionary and write them on the board. Were the students correct? Was their educated guess correct?

With this information fresh on their minds have them think about **membranes**. First look at the basic structure of membranes. This should be a review since membranes were presented during the classes on cell components. Let's begin with lipids. Ask students the following questions:

- How are lipids positioned in a membrane? *Answer: the hydrophobic part is in the interior and the hydrophilic part is on the outside.*
- Ask them why. *Answer: hydrophobic molecules hate water and want to stay as far away as possible from water. Hydrophilic molecules love water and want to be in it.*
- How do hydrophobicity and hydrophilicity determine the structure of a membrane? *Answer: A lipid has a hydrophobic and hydrophilic part. In order for the hydrophobic part to be in the center there must be two layers together with the hydrophobic parts in the center and the hydrophilic parts on the outside. Thus, the cell membrane is a bilayer in order to deal with the love and hate relationship that lipids have with water.*
- How do the components of a molecule determine if it is hydrophilic or hydrophobic? *Answer: If they are all carbons and hydrogens they tend to be hydrophobic (nonpolar); if they have hydroxyl or phosphate groups (something with a charge either negative or positive or polar) they tend to be hydrophilic. Therefore, the individual atoms determine which parts of a molecule are hydrophobic or hydrophilic.*

Relate these terms to how a membrane is composed – **fluid mosaic model**. Ask the students if they think this form is cost efficient. In fact, it is, because the cell needs to spend less energy to maintain this form. Why? Because it costs energy to keep a hydrophobic molecule in the presence of water and a hydrophilic molecule in the middle of a hydrophobic area. Thus, the form of a membrane costs the least energy possible. There is one more part to the cell membrane: the proteins. Ask students "How are these proteins placed in a membrane?" Remind the students to think about hydrophobic and hydrophilic areas of proteins. The hydrophobic parts of a protein will want to be in the center of the membrane where it is hydrophobic. The hydrophilic parts will want to be on the outside where the water is. This is exactly what happens and why some proteins are peripheral and others integral. Have a student draw a quick sketch of the final view of a membrane with its peripheral and integral proteins. It would be good to have an overhead to show as well, possibly the one made by the group who presented membrane structure during the cell component lesson.