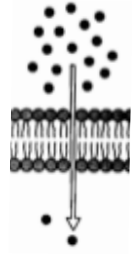

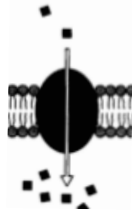
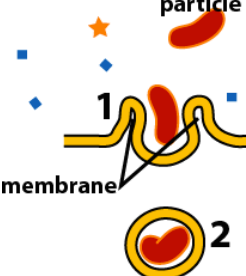


## How Things Get into and out of Cells

### I. Membrane Transport Reading:

They say (summary)

I say (questions, connections, extensions)

<p>The main function of the cell membrane is to control what can enter the cell, and what can leave. The membrane's structure allows it to perform this function. To begin with, because the membrane is so thin and so fluid, many substances can diffuse right through the phospholipid bilayer. Diffusion through the phospholipid bilayer is called <b>simple diffusion</b>.</p> <p>Molecules that enter and leave the cell by simple diffusion include many small, non-polar molecules such as oxygen and carbon dioxide. In addition, large, non-polar lipids like triglycerides and steroid hormones can dissolve into the lipid bilayer and enter cells through simple diffusion.</p>	
<p>For other molecules, the situation is more complex. Molecules that are polar are pushed away from the hydrophobic portion of the membrane, and can't diffuse through. This includes sugars like glucose, which cells constantly need for energy. To allow molecules like glucose to enter, cells have evolved a variety of <i>protein channels</i>. These channels provide specific pathways for certain molecules to diffuse through. When a molecule like glucose diffuses into a cell through a protein channel, the process is called <b>facilitated diffusion</b>.</p>	
<p>Whether it's simple or facilitated, diffusion doesn't require the cell to use any of its own energy. The energy comes from the kinetic energy (energy of motion) of the diffusing molecules. Consequently, any type of diffusion can be considered to be <b>passive transport</b>. On the other hand, sometimes a cell needs to move a substance from lower concentration to higher concentration. Moving substances against the direction of diffusion, from low to high concentration, is called <b>active transport</b>, and it requires lots of energy. Cells use special <b>carrier proteins</b> in order to make this process happen. You can think of these as <i>molecular pumps</i>.</p>	
<p>Sometimes, cells need to take a large particle of food from outside the cell into itself. Or, on an even larger scale, a white blood cell (a cell in the immune system) might attack an invading bacterial cell by surrounding it, engulfing it, and digesting it. This process of taking things into the cell involves first creating an indentation in the membrane, then surrounding the particle or prey, and then bringing a vesicle containing the particle or prey into the cytoplasm of the cell. The process is called <b>endocytosis</b>.</p>	
<p>An opposite process, called <b>exocytosis</b>, occurs during cell export. For example, when a protein is made for export it starts out in the rough ER, and then moves to the Golgi for packaging and modification. Next, the Golgi buds off a vesicle. The vesicle then fuses with the membrane, dumping its contents into the fluid outside the cells.</p>	