

## **CHAPTER 10. MOVEMENT OF SOLUTES ACROSS A PERMEABLE MEMBRANE**

Every living cell must acquire from its surroundings the raw materials for biosynthesis and for energy production, and must release to its environment the byproducts of metabolism.

A few nonpolar compounds can dissolve in the lipid bilayer and cross the membrane unassisted, but for polar or charged compounds or ions, a membrane protein is essential for transmembrane movement.

In some cases a membrane protein simply facilitates the diffusion of a solute down its concentration gradient, but transport often occurs against a gradient of concentration, electrical charge, or both, in which case solutes must be “pumped” in a process that requires energy

Ions may also move across membranes via ion channels formed by proteins, or they may be carried across by ionophores, small molecules that mask the charge of the ions and allow them to diffuse through the lipid bilayer. With very few exceptions, the traffic of small molecules across the plasma membrane is mediated by proteins such as transmembrane channels, carriers, or pumps.

Within the eukaryotic cell, different compartments have different concentrations of metabolic intermediates and products and of ions, and these, too, must move across intracellular membranes in tightly regulated, protein-mediated processes.

When two aqueous compartments containing unequal concentrations of a soluble compound or ion are separated by a permeable divider (membrane), the solute moves by simple diffusion from the region of higher concentration, through the membrane, to the region of lower concentration, until the two compartments have equal solute concentrations.