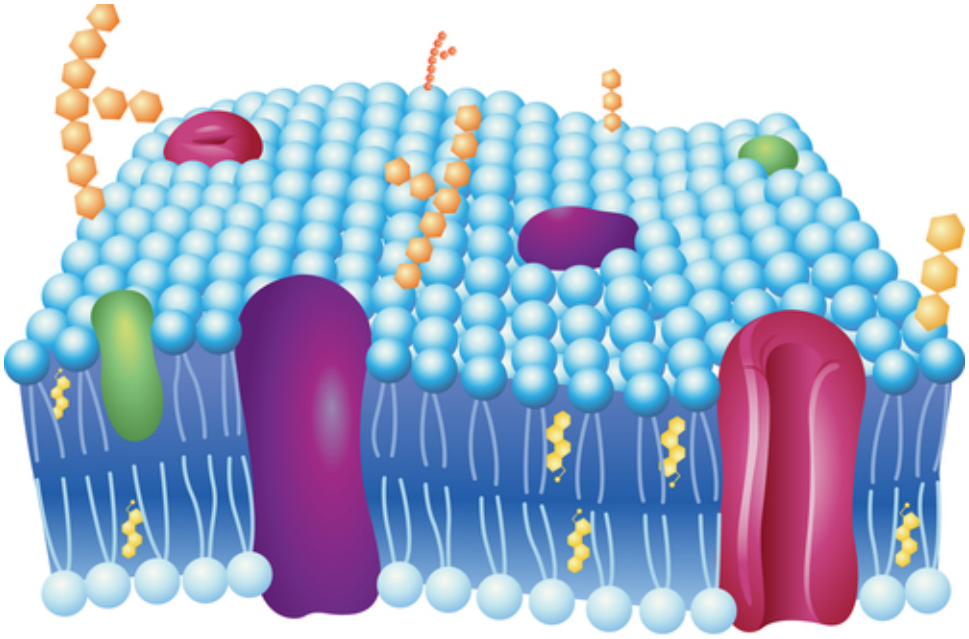
CHAPTER 1

Cell Membrane - Phospholipid Bilayers

- Describe the structure and function of the plasma membrane.



All cells have a plasma membrane. This membrane surrounds the cell. So what is its role?

Can molecules enter and leave the cell? Yes. Can anything or everything enter or leave? No. So, what determines what can go in or out? Is it the nucleus? The DNA? Or the plasma membrane?

The Plasma Membrane

The **plasma membrane** (also known as the **cell membrane**) forms a barrier between the cytoplasm inside the cell and the environment outside the cell. It protects and supports the cell and also controls everything that enters and leaves the cell. It allows only certain substances to pass through, while keeping others in or out.

The ability to allow only certain molecules in or out of the cell is referred to as selective permeability or **semipermeability**.

To understand how the plasma membrane controls what crosses into or out of the cell, you need to know its composition.

The plasma membrane is discussed at http://www.youtube.com/watch?v=-aSfoB8Cmic (6:16).

A Phospholipid Bilayer

The plasma membrane is composed mainly of phospholipids, which consist of fatty acids and alcohol. The phospholipids in the plasma membrane are arranged in two layers, called a **phospholipid bilayer**.

As shown in **Figure** 1.1, each phospholipid molecule has a head and two tails. The head "loves" water (**hydrophilic**) and the tails "hate" water (**hydrophobic**). The water-hating tails are on the interior of the membrane, whereas the

water-loving heads point outwards, toward either the cytoplasm or the fluid that surrounds the cell. Molecules that are hydrophobic can easily pass through the plasma membrane, if they are small enough, because they are water-hating like the interior of the membrane. Molecules that are hydrophilic, on the other hand, cannot pass through the plasma membrane—at least not without help—because they are water-loving like the exterior of the membrane.

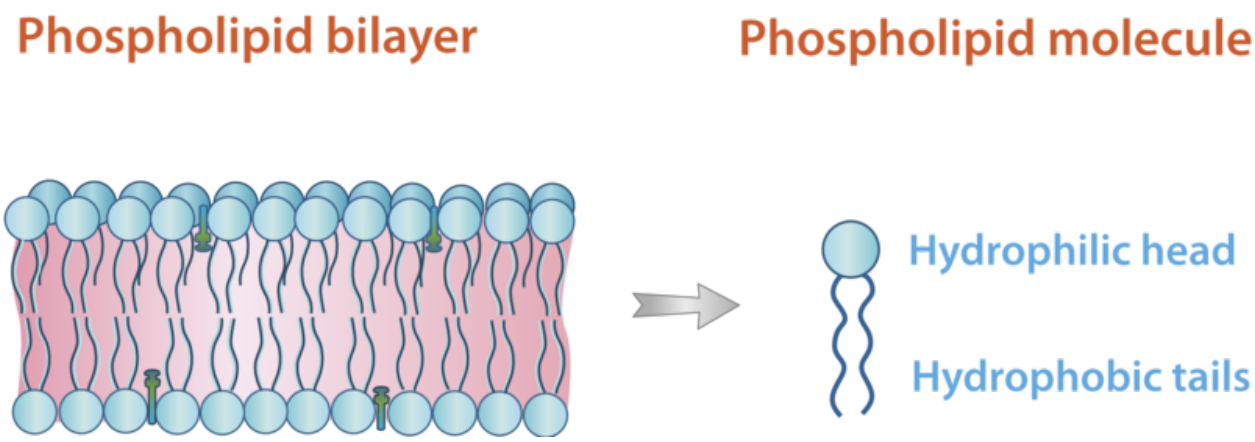


FIGURE 1.1

Phospholipid Bilayer. The phospholipid bilayer consists of two layers of phospholipids (left), with a hydrophobic, or water-hating, interior and a hydrophilic, or water-loving, exterior. A single phospholipid molecule is depicted on the right.

Vocabulary

- **cell membrane**: Barrier between the cytoplasm and the environment outside the cell; also known as the plasma membrane.
- **hydrophilic**: Characteristic of the phospholipid head group; water-loving.
- **hydrophobic**: Characteristic of the phospholipid tails; water-hating.
- **phospholipid bilayer**: Double layer of phospholipid molecules that makes up a plasma membrane
- **plasma membrane**: Thin coat of lipids (phospholipids) that surrounds and encloses a cell; also known as the cell membrane.
- **semipermeability**: The ability to allow only certain molecules to cross the plasma membrane; selective permeability.

Summary

- The plasma membrane forms a barrier between the cytoplasm and the environment outside the cell. The plasma membrane has selective permeability.
- The plasma membrane is primarily composed of phospholipids arranged in a bilayer, with the hydrophobic tails on the interior of the membrane, and the hydrophilic heads pointing outwards.

Practice

Use these resources to answer the questions that follow.