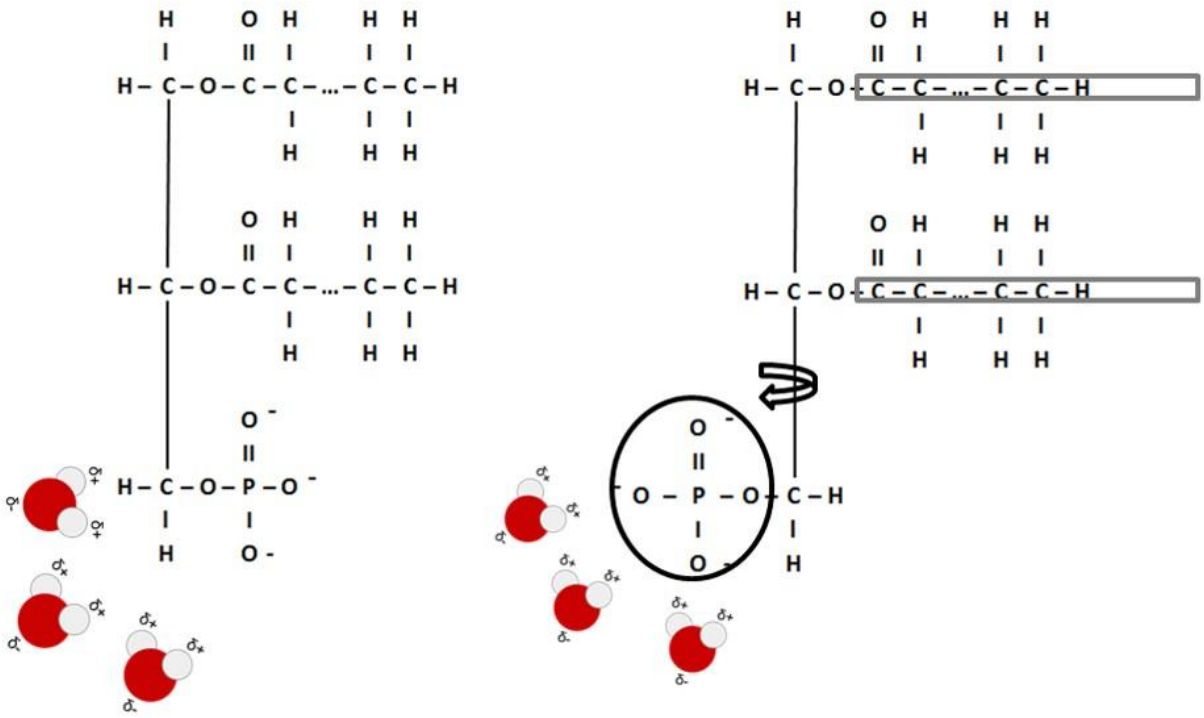
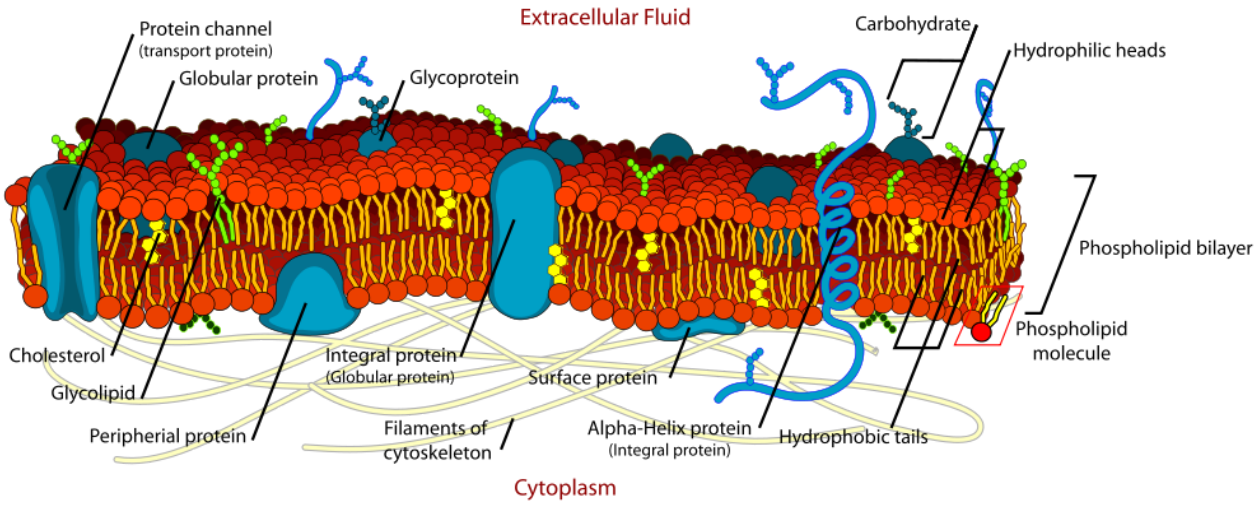
4.1.2

Phospholipids

A **phospholipid** is structurally similar to a triglyceride. However, one of the three fatty acids is substituted for a polar phosphate group (see image below). This creates a molecule that is hydrophilic on one end (the phosphate group) and hydrophobic on the other end (2 fatty acid tails). This type of molecule – hydrophobic on one end and hydrophilic on the other – is referred to as **amphipathic.** The amphipathic nature of phospholipids allows them to maintain the structural integrity of cell membranes and serves as a selectively permeable barrier that modulates movement of substances in and out of cells.



Phospholipid Structure Showing Polar Phosphate Group. *Image created by JS at BYU-Idaho 2014; modified File: Na+H2O.svg; Author: Taxman; Site: https://commons.wikimedia.org/wiki/File:Na%2BH2O.svg; License: Public Domain*
Because of their amphipathic nature, phospholipids spontaneously coalesce into spheres (called micelles) when placed in water. In like manner, a double layer of phospholipids, called a lipid bi-lipid layer, constitutes a cell membrane (see figure below).



Cell Membrane Detailed Diagram *File: Cell membrane detailed diagram en.svg; Author: LadyofHats Mariana Ruiz; Site: https://commons.wikimedia.org/wiki/File:Cell_membrane_detailed_diagram_en.svg; License: Public Domain*
In a cell membrane the polar heads of the phospholipids are oriented towards the aqueous cytoplasm and also towards the extracellular water. The fatty acid tails are oriented away from water but blend with each other. This configuration creates a barrier or boundary that separates the cytoplasm environment from the extracellular environment. Cell membranes also contain proteins and cholesterol (a steroid lipid) which aid in attachment and signaling, and also membrane integrity (see image above).