Standard: Students will analyze the nature of the relationships between structures and functions in living cells.

Element: Identify the functions of the four major macromolecules (i.e., carbohydrates, proteins, lipids, and nucleic acids)

EQ: What is the structure and function of lipids?

Remember, yesterday we learned there are four categories of macromolecules that make up everything in your cells:

1) carbohydrate
2) lipids
3) proteins
4) nucleic Acid

Lipids:

molecules made of long chains of carbon + hydrogen (fats)

A. Function of lipids

1. Energy Storage

-When food is plentiful, animals convert excess food into fats for long term energy storage.

-When food is scarce, animals can break down the fat molecules to release energy.

2. Water Barrier

-The outer layer of the cell is made up of phospholipids and controls what materials come in and out of the cell.

-Stems and leaves of many plants are covered with a thin layer of wax. That prevents water from leaving the plant cells.

B. Structure of Lipids

Lipids consist of these elements: carbon, hydrogen, oxygen, and sometimes phosphorus (in phospholipids).

The building blocks of lipids are fatty acids, which are carbon atoms are arranged in long chains.

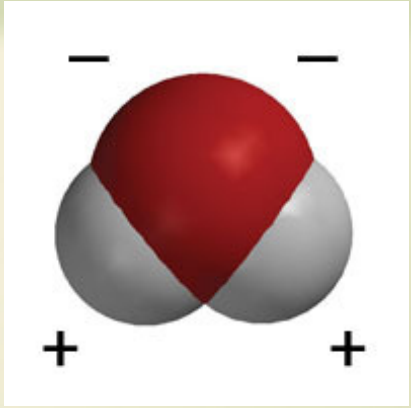
Lipids are nonpolar, so they do not mix with water or other polar molecules.

Polar vs. Nonpolar

- A **polar molecule** is a molecule with a slight positive charge on one side and a slight negative charge on the other. (example: water)
- A **nonpolar molecule** is completely neutral on all sides. (example: oil)
- ***Polar*** and ***Nonpolar*** molecules do NOT mix!

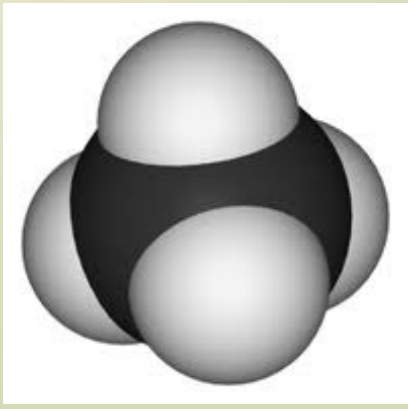
Polar vs. Nonpolar

- A water molecule looks like this:



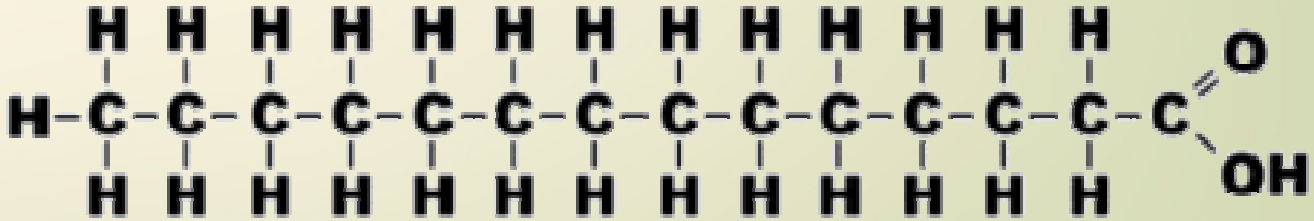
  > Polar molecules stick to each other because opposite charges attract.

- A nonpolar molecule looks like this:



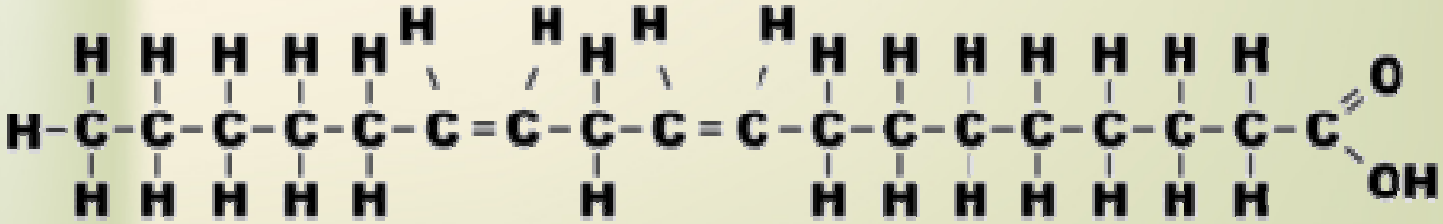
1. **Saturated fats**: solid at room temperature

Examples: butter, lard, wax



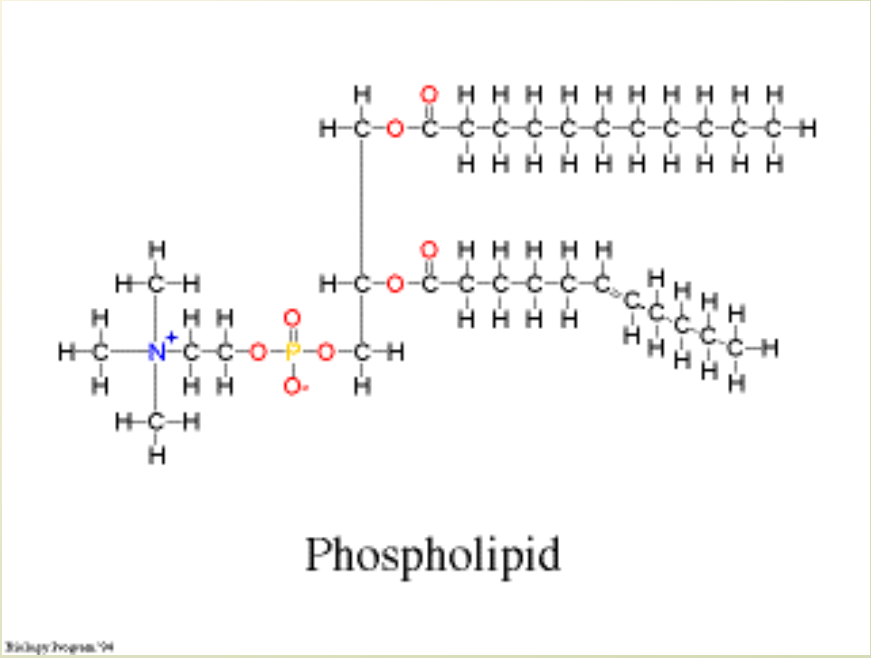
2. **Unsaturated fats**: liquid at room temperature

Examples: olive oil, omega-3 fatty acid

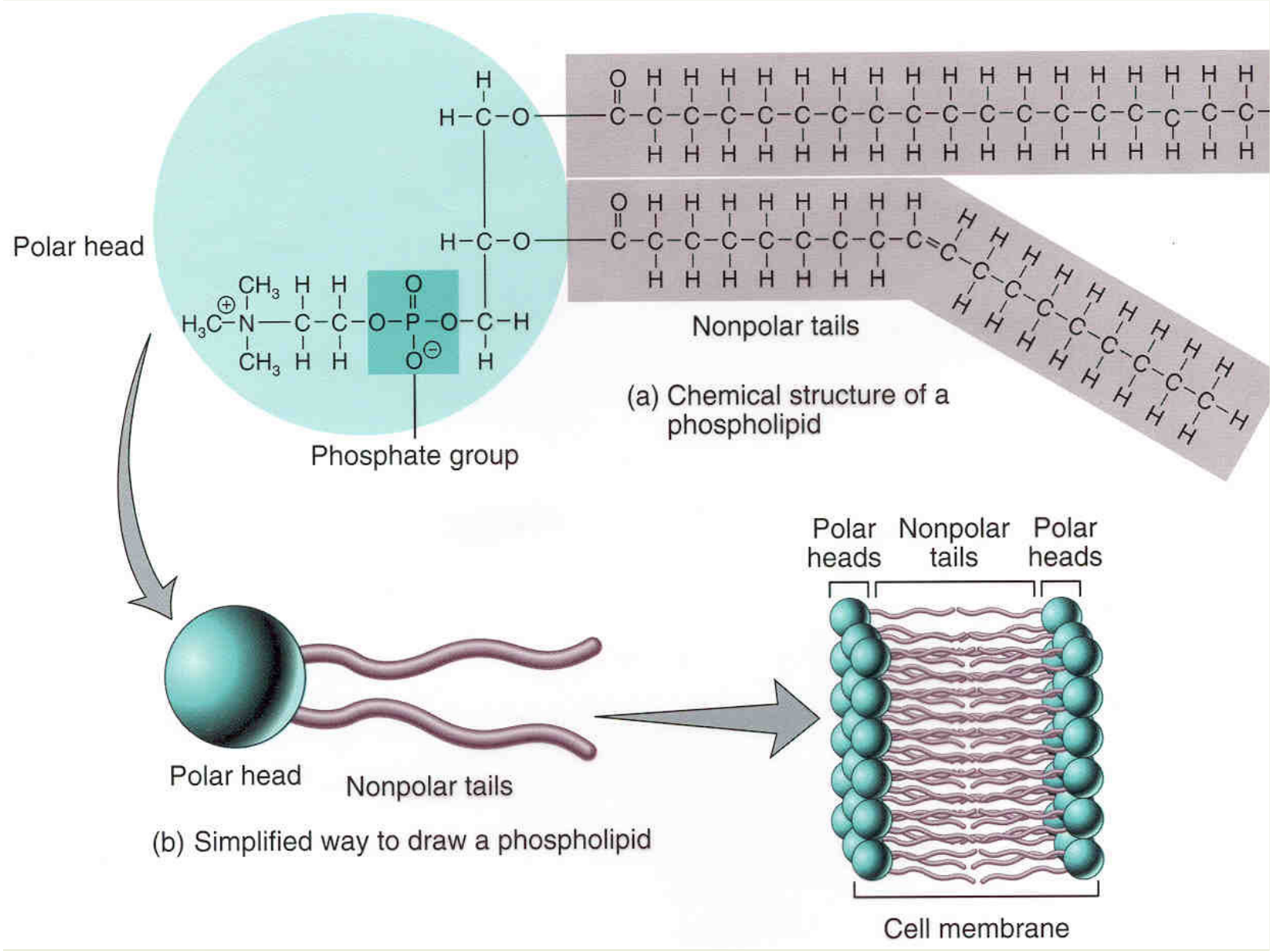


3. **Phospholipid**: special type of lipid that makes up cell membranes

One side is polar and the other is nonpolar.



Phospholipid


Polar head
Phosphate group
Nonpolar tails
(a) Chemical structure of a phospholipid
Polar heads
Nonpolar tails
Polar heads
Polar head
Nonpolar tails
(b) Simplified way to draw a phospholipid
Cell membrane

Let's answer the EQ:

What is the structure and function of lipids?