Molecules of Life

Carbohydrates

Proteins

Lipids

Nucleic Acids

Today's Objectives:

- Identify the essential elements of nutrition.
- Compare and contrast carbohydrates, lipids, and proteins.

Essential Question: Compare and contrast the four macromolecules discussed today, how can you make sure you are getting a healthy amount of those four?

Key Terms…

- Carbohydrate
- Monosaccharide
- Disaccharide
- Polysaccharide
- Protein
- Amino acid
- Peptide bond
- Polypeptide
- Enzyme
- Active site
- Lipid
- Fatty acid
- Deoxyribonucleic Acid (DNA)
- Ribonucleic Acid (RNA)

How many have You heard of Before?

Carbohydrates…

- Made from:
  - Carbon, Hydrogen, & Oxygen
  - Ratio 1:2:1
  - Major source of Energy

Why do athletes Often eat pasta Before big games?

Monosaccharides… The building blocks of Carbohydrates

- A Monomer of a Carbohydrate
- Known as a Simple Sugar

If glucose is sugar,
What foods are examples
Of Carbohydrates?

- Most common types:
  - **Glucose**- Main source of energy in the cells
  - **Fructose-** Found in fruits, the sweetest of the monosaccharides
  - **Galactose-** Found in milk

Disaccharides & Polysaccharides…

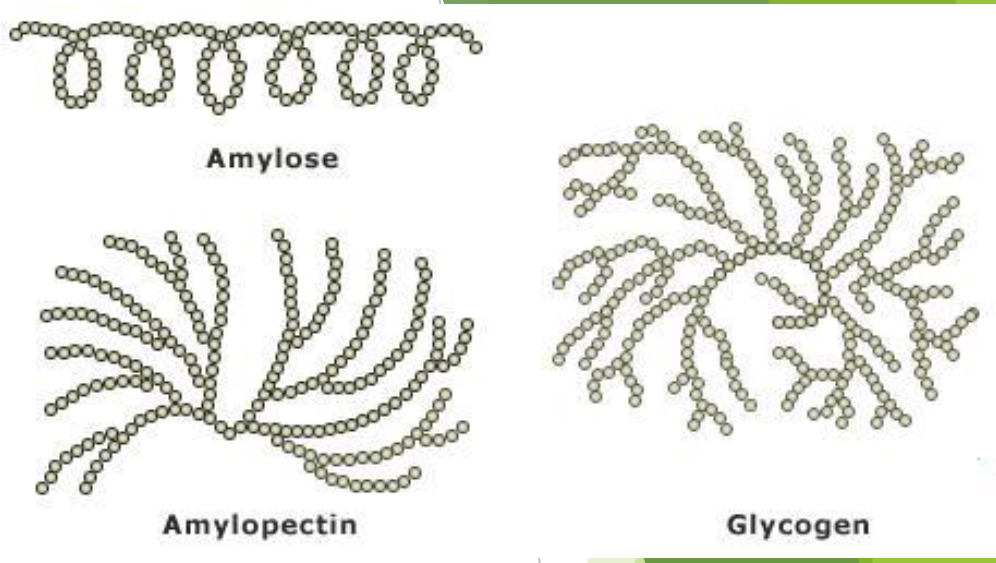
Disaccharides

- Formed from 2 Monosaccharides (Condensation Reaction)
- Sucrose (Table Sugar)
  - Formed from Fructose and Glucose

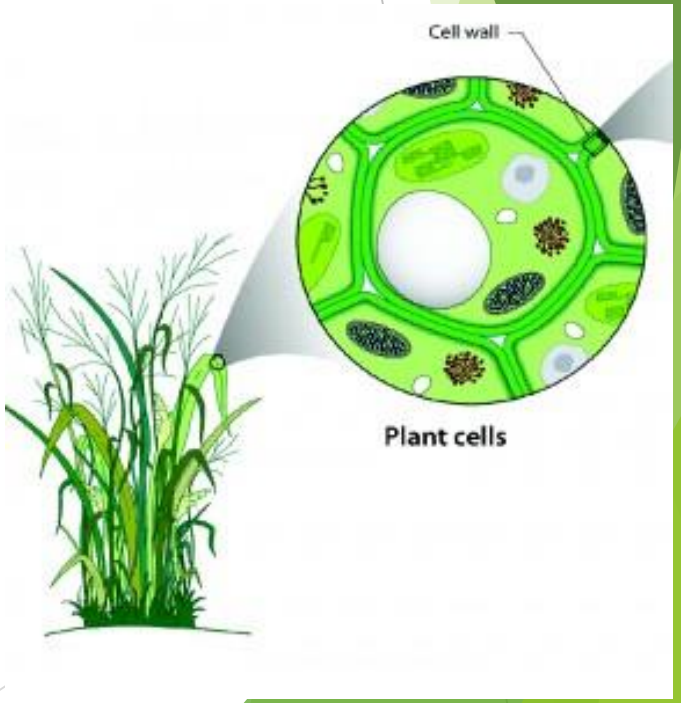
What can we Infer the prefix Di- means?

Polysaccharides…

- Formed from 3 or more Monosaccharides
- **Glycogen**- Animals store Glucose in the form of Glycogen
  - Stored in the Liver & Muscles



- Plants store Glucose in 2 forms:
  - 1. Starch
  - 2. Cellulose
    - Gives strength & Rigidity to plant cell walls
    - Makes up 50% of wood.



Why can cows eat Grass but not us?

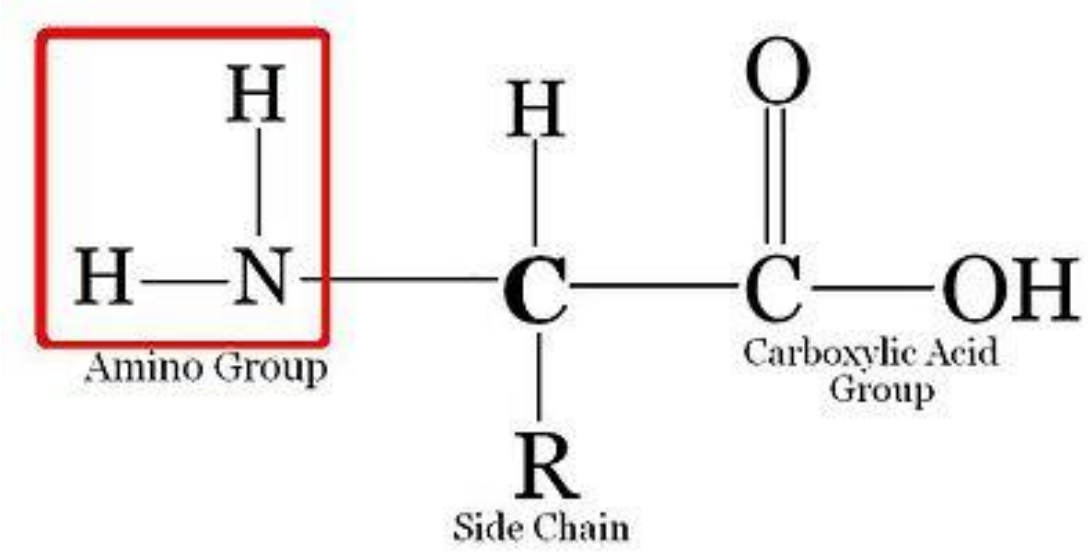
Proteins…

- Made from Carbon, Hydrogen, Oxygen & Nitrogen
- Formed from the monomers called **Amino Acids.**
- **Examples:**
- **Hair, horns, skin, muscles, & Enzymes**

Think about the Food you eat, what are Some examples of Proteins?

Amino Acids… the building blocks of proteins!

- 20 different Amino Acids
- Carbon bonded to 4 other atoms:
- 1. Carboxyl group
- 2. Amino Group
- 3. Hydrogen
- 4. “R” Group

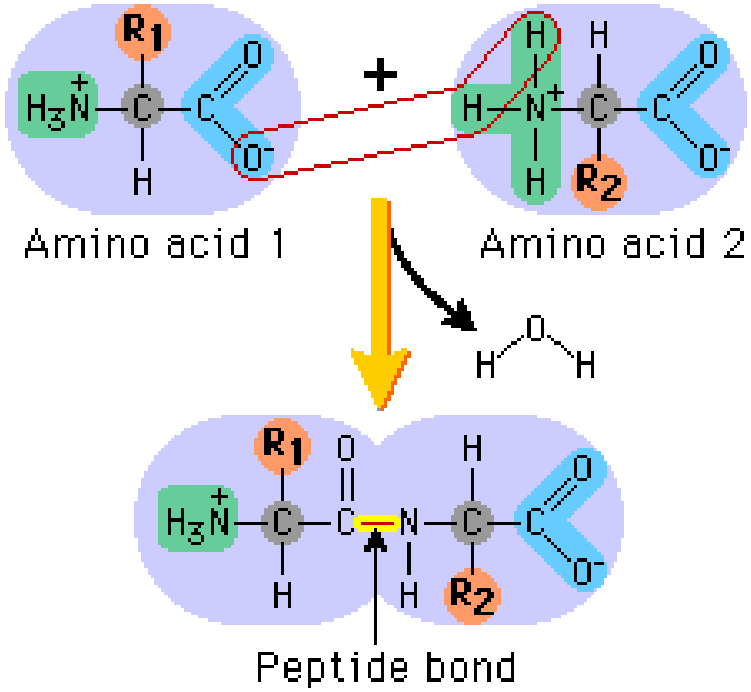


- The main difference in the Amino Acid is the “R” group.

Peptide Bonds…

- Amino Acids join together by Peptide Bonds.(Condensation Reaction)

- Dipeptide (_____ Amino Acids joined together)
- Polypeptide (_____ Amino Acids linked together)



Lipids…(Fats)

- Non-Polar (Do Not Like Water)
- Higher ratio of Carbon & Hydrogen to Oxygen than carbohydrates.
- They store MORE energy than other organic compounds.

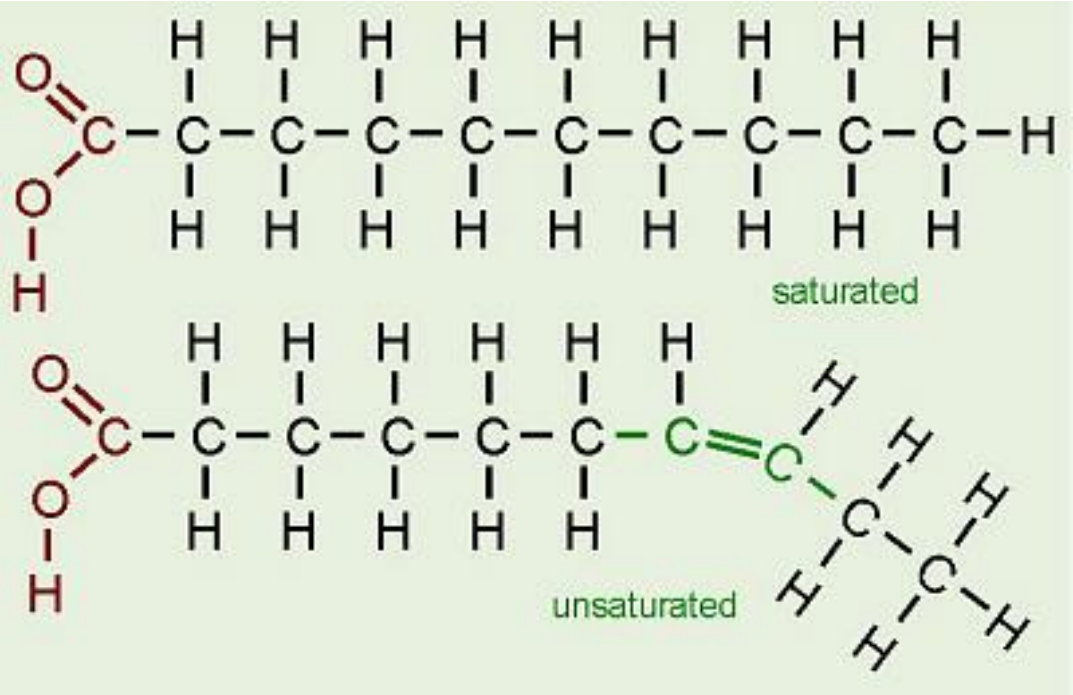
- Include:
- Triglycerides
- Phospholipids
- Steroids
- Waxes

- Lipid Video

If fats store energy,
What may happen
If we eat fats in excess?

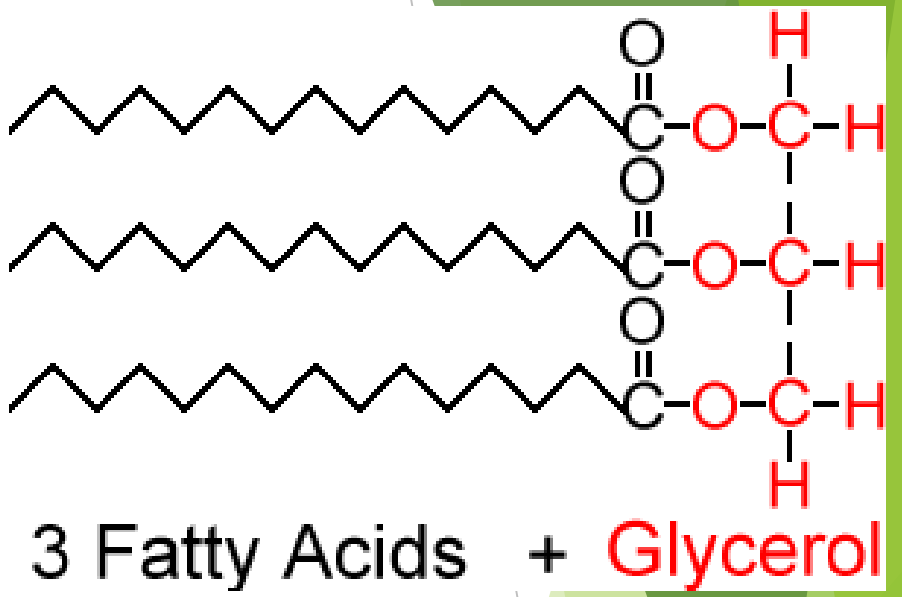
Fatty Acids… The building blocks of Lipids!

- Carboxyl Head (-COOH)
  - Polar (Likes Water)
- Long Carbon Chain
  - Nonpolar (Hates Water)



Triglycerides… very unhealthy to eat!

- 3 Fatty Acid Molecules
- 1 Glycerol Molecule



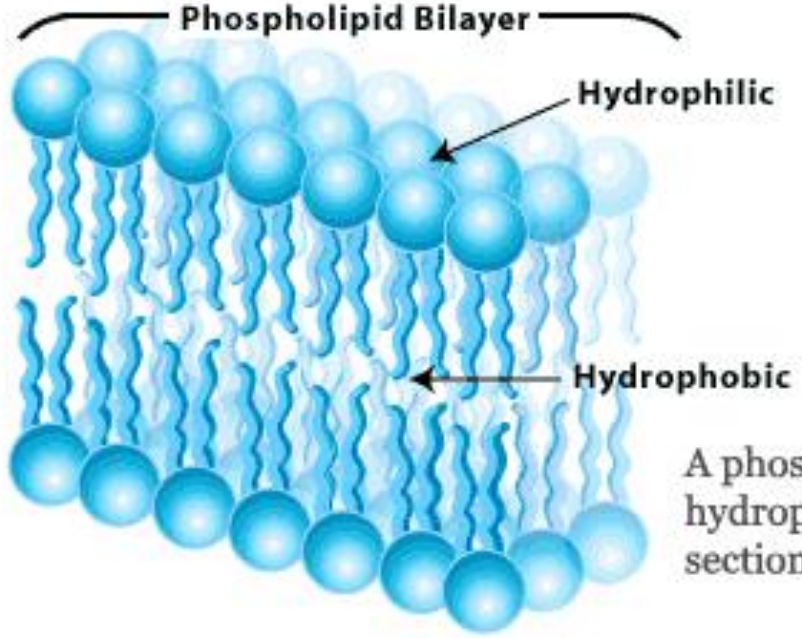
- Found in foods:
- Saturated= Hard at room temperature
  - Butter, meat fats
- Unsaturated = Liquid at room temperature
  - Found in Plant seeds
  - Oils

Phospholipids…

- 2 Fatty Acids + 1 Glycerol Molecule
- Phosphate group

- Make up the Cell's Membrane (Lipid Bilayer)

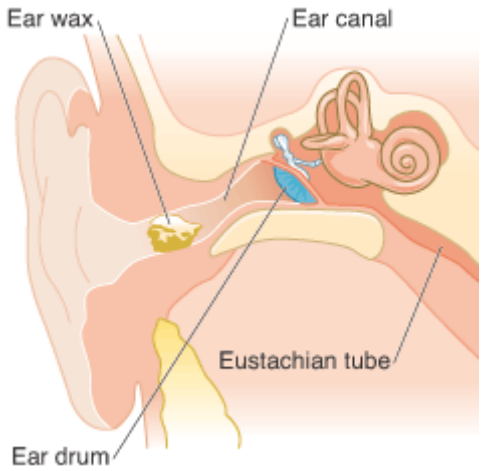
If hydro means water
And phobic means strongly dislike
Or repels, what does hydrophobic
Mean?



A phospholipid bilayer with hydrophobic and hydrophilic sections indicated.

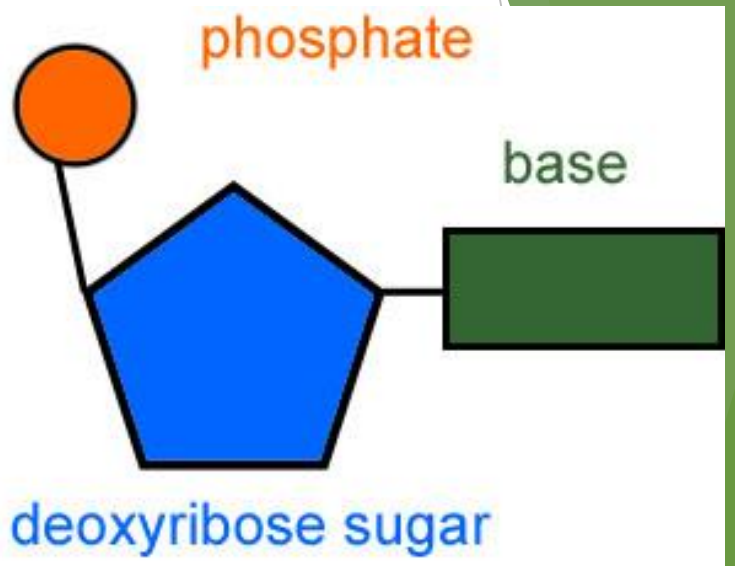
Waxes & Steroids…

- Waxes are waterproof and form protective layers
  - Ear wax keeps out microorganisms



- Steroids
  - Testosterone
  - Cholesterol
    - Found in cell membrane
    - Nerve cells

Nucleic Acids…



- Purpose: Store & Transfer important information in the cell
- Building Block = **Nucleotide**
  - **Phosphate Group**
  - **5 Carbon Sugar Molecule**
  - **Nitrogenous Base**
- 2 Types (examples)
- DNA (DeoxyriboNucleic Acid)
- RNA (RiboNucleic Acid)
- Nucleic Acid Video

Thinking about DNA, Why would nucleic Acids be important to our Survival?

Building Blocks…

Carbohydrates	Proteins	Lipids	Nucleic Acids
Monosaccharides	Amino Acids	Fatty Acids	Nucleotides

Key Terms…

*Let's revisit these terms, if you see them in your notes, underline or **highlight** them.*

- Carbohydrate
- Monosaccharide
- Disaccharide
- Polysaccharide
- Protein
- Amino acid
- Peptide bond
- Polypeptide
- Enzyme
- Active site
- Lipid
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Avid Foldable: Macromolecules

Create a Macromolecule Foldable

- Use 1 piece of printer paper
  - Fold each side of paper into middle. (See my example)
- Label 4 different tabs
  - Carbohydrates, Proteins, Lipids, Nucleic Acids
- On inside flaps, list the following information:
  - Definition (including building blocks)
  - Examples
- Middle Compare/Contrast Circle:
  - Elements or components that make it up
  - Where they are found
  - What is their primary role

Grading Rubric:

-Pictures on front	=	2 pts each (8 total)
-Definitions	=	2 pts each (8 total)
-Ex of Biomolecules	=	1 pt each (4 total)
-Middle Chart Compare/Contrast	=	6 pts
Total Points Possible	=	26 points