

- **Lipids:** Diverse class of organic molecules that includes **fats, oils, waxes, and steroids**. They are hydrophobic meaning they are not water-soluble. Lipids consist of a **glycerol** (Alcohol head) with **fatty acid tails**
 - **Saturated:** Solid at room temperature, come from animals, and straight due to the single bonded Carbon molecules.
 - **Unsaturated:** Liquid at room temperature, come from plants, and is kinked due to a double bond.
 - **Steroids:** Lipids with 4 fused rings that act differently than other lipids.
 - Ex: Testosterone
 - **Functions of Lipids:**
 - **Energy Storage:** Lipids release calories (units of energy) when burned.
 - **Structural:** Phospholipid layers make up the cellular membranes in animal cells.
 - **Endocrine:** Some lipids act as hormones.
 - **Phospholipids:** Modified lipids that contain a hydrophilic head (phosphate/glycerol) with hydrophobic tails (fatty acids).
- **Proteins:** Complex macromolecules that carry out...
 - **Growth/Repair**
 - **Cell signaling**
 - **Regulation:** Hormones like insulin regulate blood sugar
 - **Enzymatic activity:** Catalyzing chemical reactions
 - **Movement:** Actin/myosin are protein fibers that regulate muscle contraction.
 - **Polymers or polypeptides,** consists of **amino acids**, which are joined by **peptide bonds**.
 - **Dipeptides:** Molecule consisting of two amino acids.
 - Amino acids consist of a **carboxyl group, amine group,** and an **R group**.
 - Amino acids differ because of their R group.
 - **Conformation:**
 - **Primary:** Linear sequence of amino acids.
 - Ex: **Insulin**
 - **Secondary:** The addition of hydrogen bonding. It creates a coiled shape (**alpha helix/beta pleated sheet**)
 - **Tertiary:** Creates an intricate 3D shape that determines specificity.
 - **Quaternary:** Structure that consists of several polypeptide chains.
 - Ex: **globular proteins (hemoglobin)**

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- **Pathways:** Metabolic series that each serve a purpose.
- **Enzymes** act as **catalytic proteins** that speed up reactions by lowering the **energy of activation**, or the amount of energy that is needed to start a reaction.
 - Enzymes are **globular proteins** that exhibit **tertiary structure**.
 - **Induced-fit model:** An enzyme is induced when a substrate enters it.
 - This forms the **enzyme-substrate complex**. They take on the name of their substrate with a suffix “**ase**.”
 - **Competitive Inhibition:** Substrate “imposters” fight for enzymes.
 - **Allosteric:** When enzymes change shape to alter their function.
 - **Noncompetitive Inhibitors/Allosteric Regulators:** Bind to another part of enzyme to change its shape, stopping function.

The Cell:

- **Theory of Endosymbiosis:** Eukaryotic cells came about when free-living mitochondria and chloroplasts joined together in a larger cell.
- All cells contain protective membranes, cytosol, ribosomes, and DNA material.
 - **Eukaryotes and Prokaryotes** are two different types of cells.

Eukaryotes	Prokaryotes
Contain distant organelles	No internal membranes; no nuclear membrane, E.R, mitochondria, vacuoles, (etc.)
DNA wrapped into chromosomes	Circular, naked DNA
Ribosomes are larger	Ribosomes are very small, simple
Metabolism is aerobic	Metabolism is anaerobic or aerobic
Cytoskeleton	No cytoskeleton
Cells are large (Animal/Plant cells)	Cells are small (Bacteria)

- **Structure & Function:**
 - **“Function dictates form”**
 - The different shape of cells helps in their functions.
 - Ex: Nerve cells (transport of signals) are long
 - Ex: Fat cells are rounded and large
 - **Why are cells so small?**