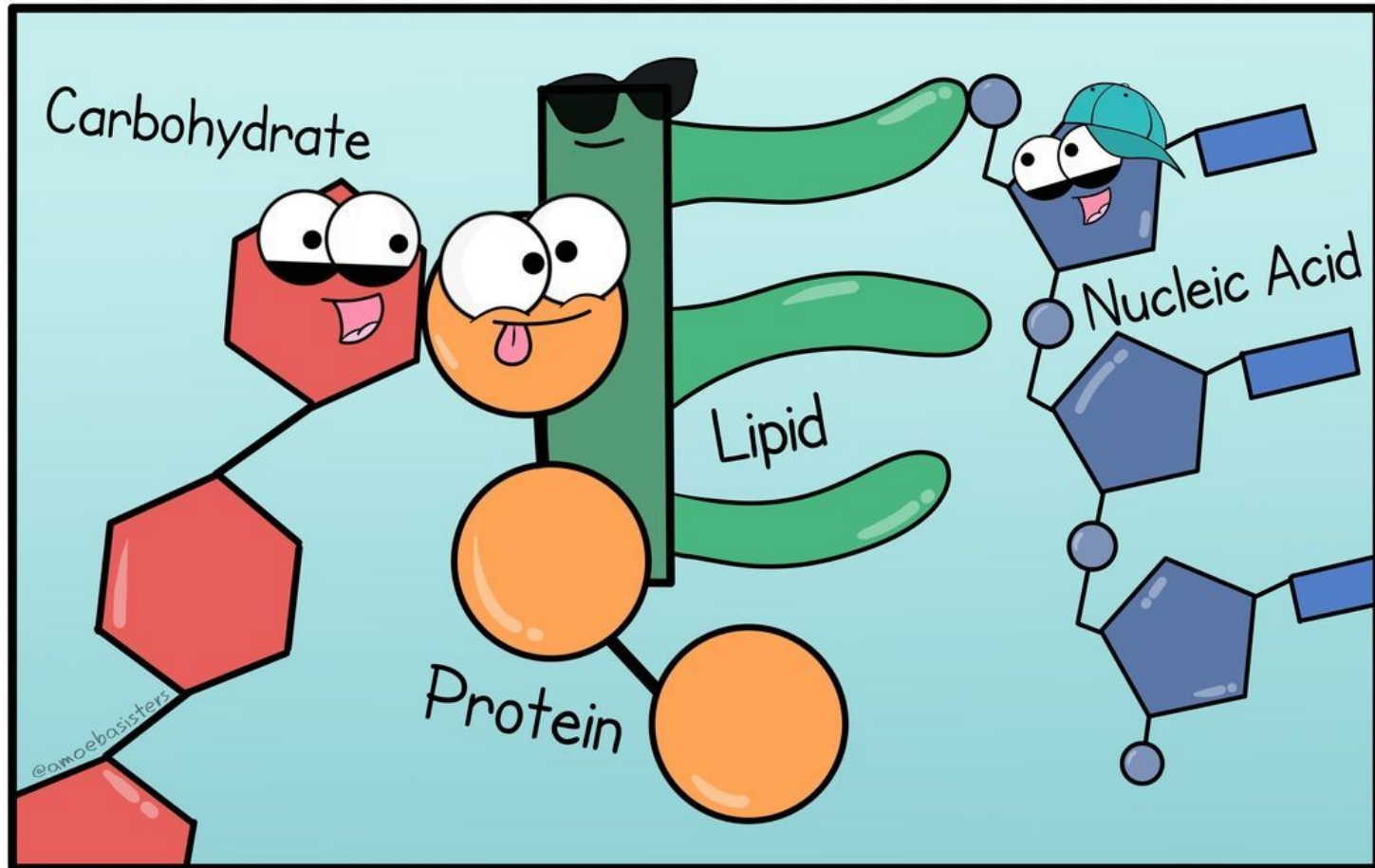


Biomolecules

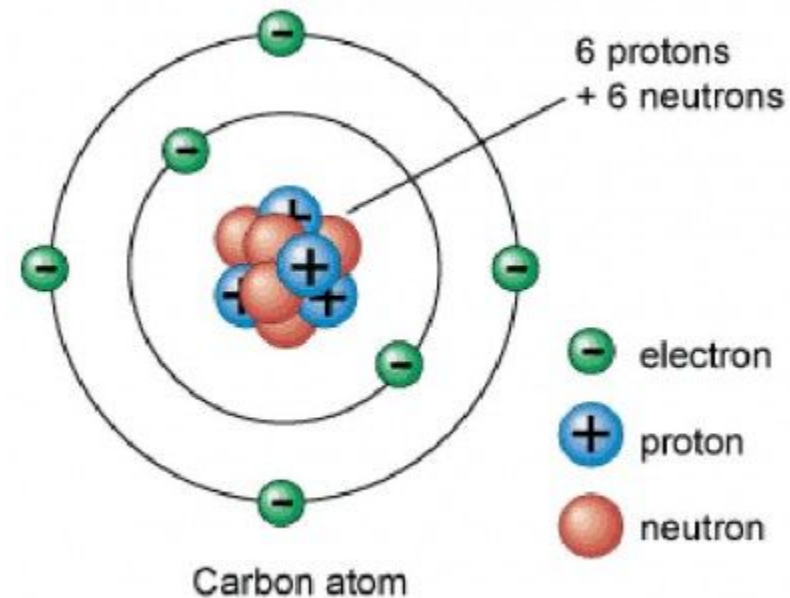
@amoebasisters



BIOMOLECULE BROS!

Chemistry of Carbon

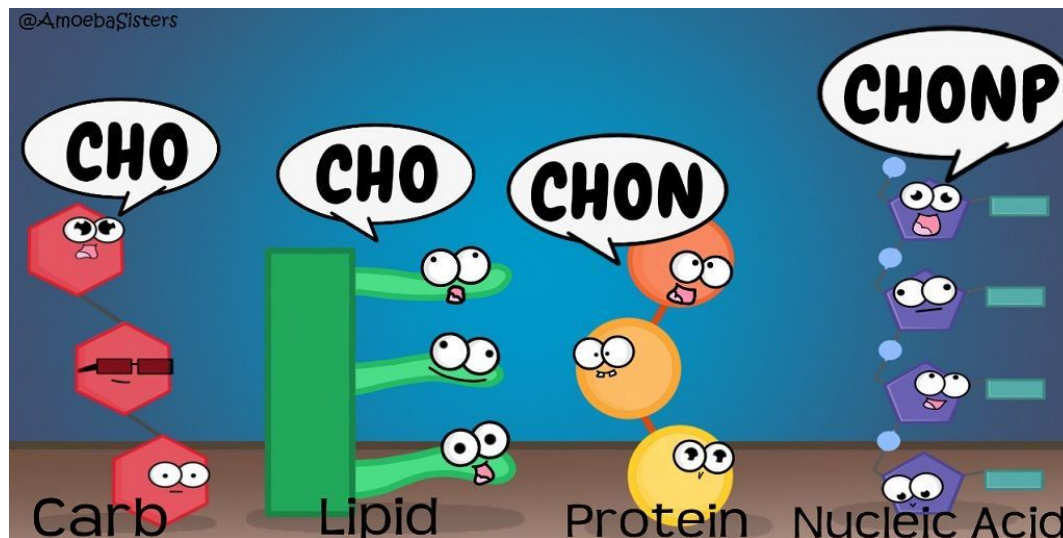
- Living organisms are made up of molecules that consist of **carbon** and other elements.



- Carbon atoms have **four** valence electrons, allowing them to form strong **covalent** bonds with many other elements, including **hydrogen, oxygen, phosphorus, sulfur, and nitrogen.**
- Carbon-carbon bonds can be single, double, or triple **covalent** bonds.

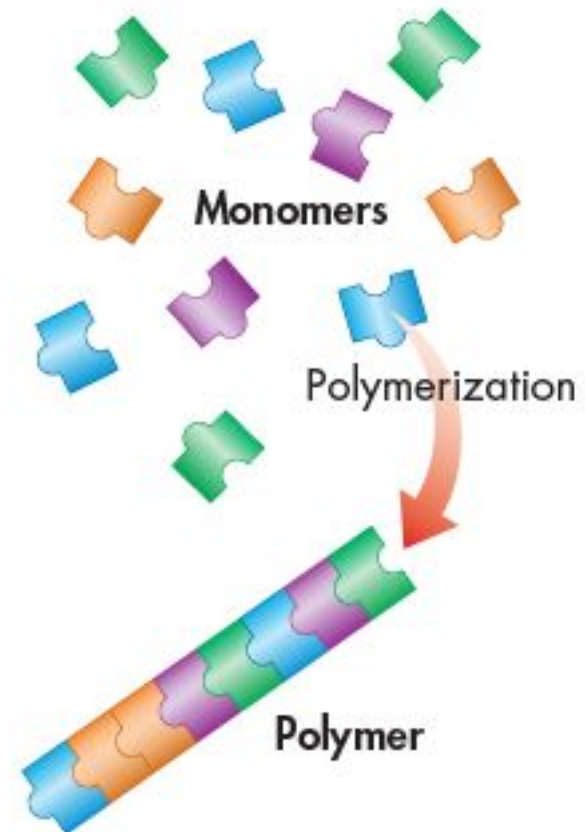
Biomolecules

- The term “biomolecule” means a **molecule present in living organisms that is necessary for survival.**
- It is also known as: **macromolecule**
 (“macro” = large)
- Elements found in biomolecules: **C, H, O, N, and/or P**



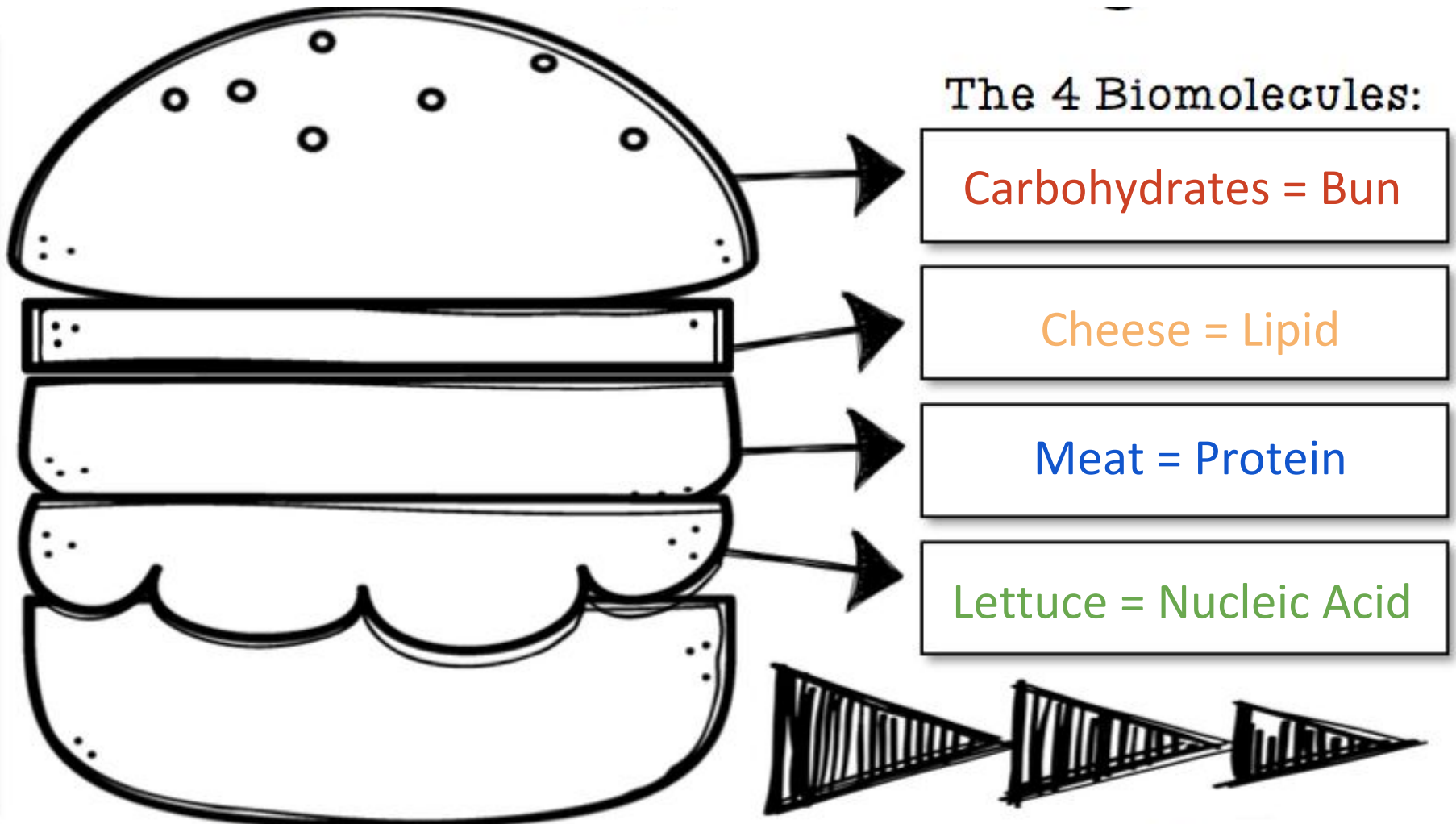
Biomolecules

- Biomolecules form by **polymerization**, in which small molecules join together to form large molecules.
- The building blocks of biomolecules are **monomers**.
- **Monomer**: (“mono” = one)
 - A small molecule that chemically bonds with a similar molecule to form a polymer.
- **Polymer**: (“poly” = many)
 - A large molecule made from monomers linked together by chemical bonds.



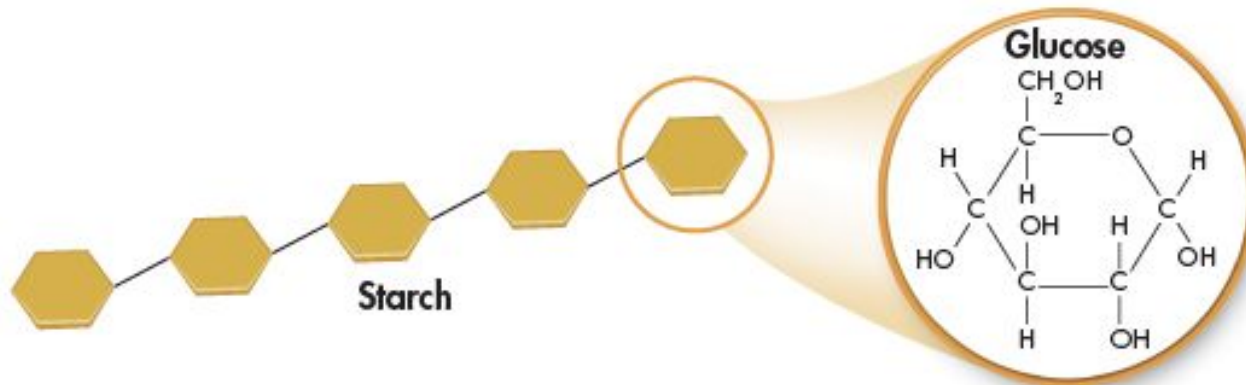
Biomolecules

The four major groups of biomolecules found in living things are:

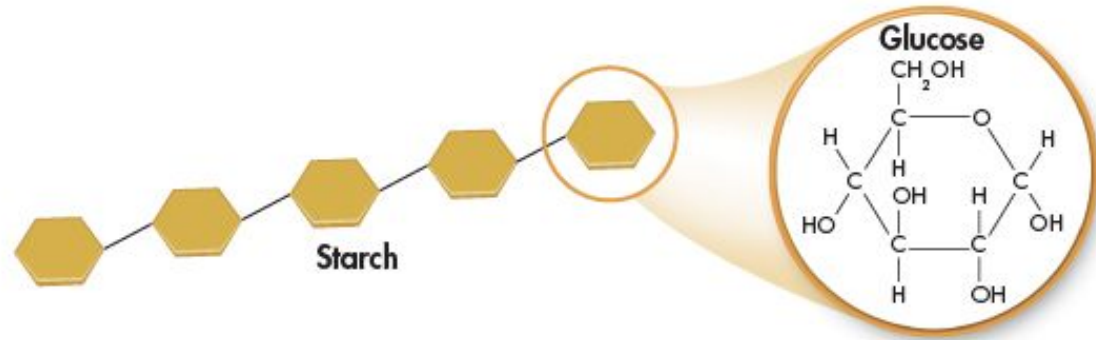


Carbohydrates

- Carbohydrates are also known as **sugars**.
- Elements: **Carbon (C), Hydrogen (H), and Oxygen (O)**
- Typically in a Ratio of: **1:2:1 Example (C₆H₁₂O₆)**
- Primary Function: **Provide short-term or quick energy for cell activities**



Carbohydrates

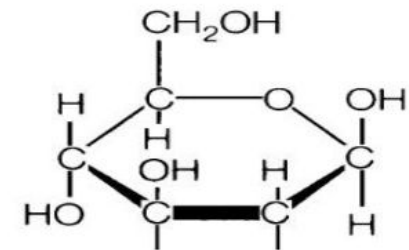


- Typical Structure: **Often a ring like a pentagon**
- Monomer: **Monosaccharide (“one sugar”)**
- Polymer: **Polysaccharide (“many sugars”) or Disaccharide (“two sugars”)**

- Typically ends in **-“ose”**

- Examples:

- **Bread**
- **Pasta**
- **Potatoes**

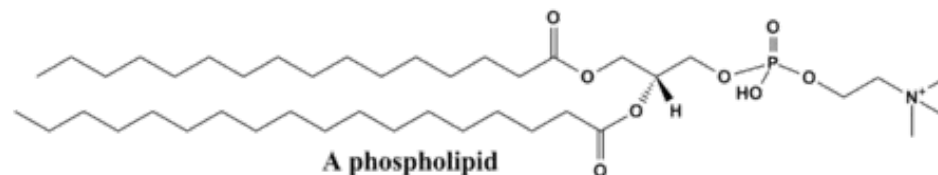
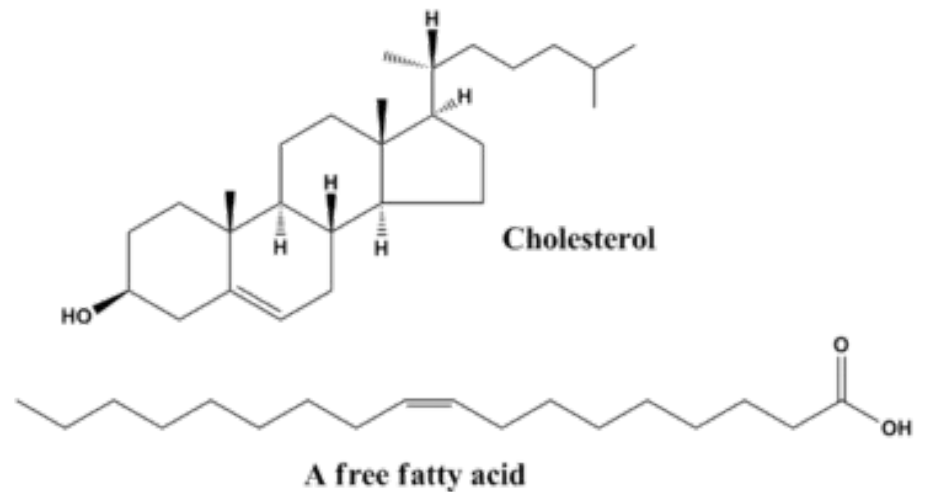
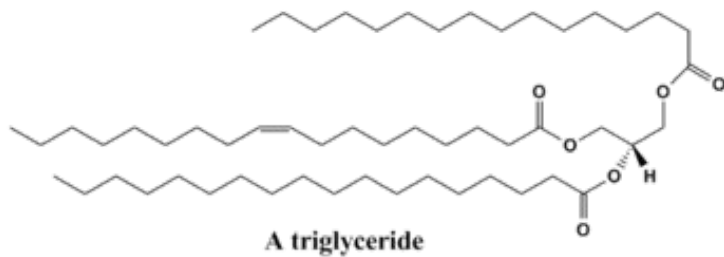


CARBOHYDRATES



Lipids

- Lipids are also known as **fats**.
- Elements: **Carbon (C), Hydrogen (H), and Oxygen (O)**
- Primary Function: **Provide long-term or stored energy for the organism**



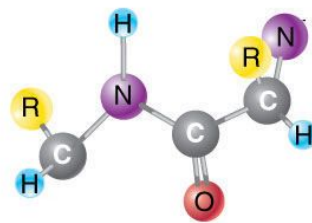
Lipids

- Typical Structure: **Long hydrocarbon chain**
- Monomer: **Fatty Acids + Glycerol**
- Polymer: **Triglyceride**
- Examples:
 - **Oils**
 - **Waxes**
 - **Steroids**
 - **Hormones**

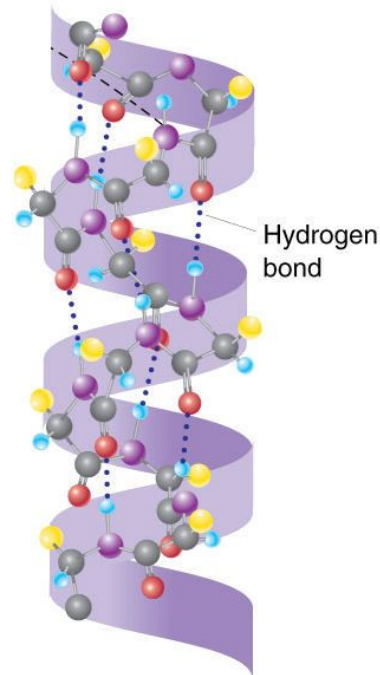


Proteins

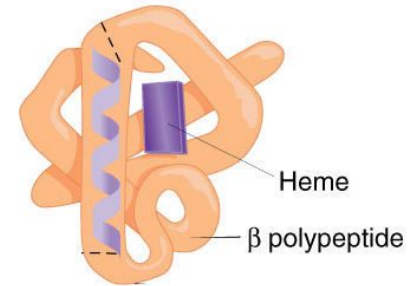
- Elements:
Carbon (C), Hydrogen (H), Oxygen (O), and Nitrogen (N)
- Primary Function: **Provides structural support; Enzymes; Immune system**



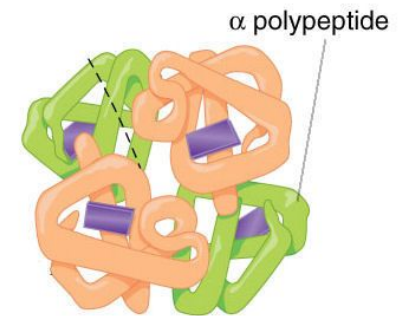
(a) Primary structure



(b) Secondary structure



c) Tertiary structure



(d) Quaternary structure

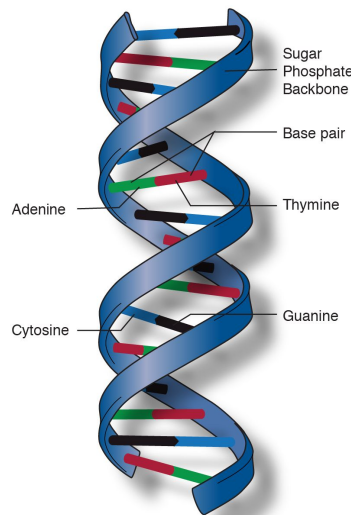
Proteins

- Typical Structure: **Complex and varied**
 - Primary - **Sequence of amino acids**
 - Secondary - **Alpha helix, Beta pleated sheets**
 - Tertiary - **Folding of secondary structures**
 - Quaternary - **3D structure of multiple amino acid chains**
- Monomer: **Amino acids**
- Polymer: **Polypeptide (amino acids linked together by peptide bonds)**
- Examples:
 - **Meat**
 - **Beans**

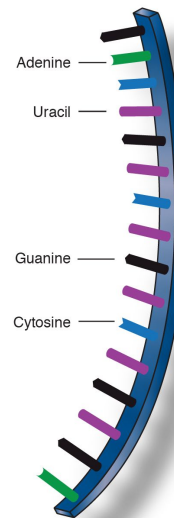


Nucleic Acids

- Elements: **Carbon (C), Hydrogen (H), Oxygen (O), Nitrogen (N), and Phosphorus (P)**
- Primary Function: **Contains and carries the genetic information of an organism**
- Monomer: **Nucleotide**
- Polymer: **Polynucleotide (Nucleic acid)**



Deoxyribonucleic acid
(DNA)



Ribonucleic acid
(RNA)

Nucleic Acids

- Nucleotide Structure:
Consists of 3 parts: a 5-carbon sugar, a phosphate group (-PO₄), and a nitrogenous base
- Examples:
 - **DNA**
 - **RNA**
 - **ATP (energy of cell)**

