Biophysics - Lecture 3

3.9.2024

Contents

1 The concept of biological macromolecules

There are 4 main Groups

- Proteins (Amino Acids)
- Nucleic Acids (Nucleotides)
- Polysaccarides (Carbohydrates)
- Lipids (Fatty Acids, Glycerol, etc)

Lipids consist of a hydrophobic tail and a hydrophillic head.
Biomolecules - some characteristics

- Polymers
  - Long chains of limited types of small molecules
  - Water soluble
- Lipids
  - Insoluble in water, or amphiphatic

Proteins are structured in 4 main parts

- Primary Structure
- Secondary Structure
- Tertiary Structure
- Quaternary Structure

1.1 Primary Structure

The linear sequence of amino acids. Proteins are built from amino acids, forming polypeptide chains.

An Amino acid contains the Amino (NH_2) group, and the carboxyl ($COOH$) group.

1.2 Secondary Structure

The local spatial arrangement of the polypeptide chain

1.3 Tertiary Structure

The three-dimensional structure of the entire polypeptide chain

1.4 Quaternary structure

1.4.1 Hemoglobin

4 almost identical parts

- Two α chains (each 141 amino acids)
- Two β chains (146 amino acids)
- each containing an Fe-Atom.

O_2 or CO_2 bins to one Fe site. The molecular structure changes (Opens up). more O_2 or CO_2 may bind to other Fe sites in the hemoglobin.

2 Basics on different families of chemical bonding