Chem 452 - Lecture 2
Protein Structure
Part 1

Question of the Day: Proteins are created in a 1-dimensional world but go on to function in the 3-dimensional world. Explain how this works.

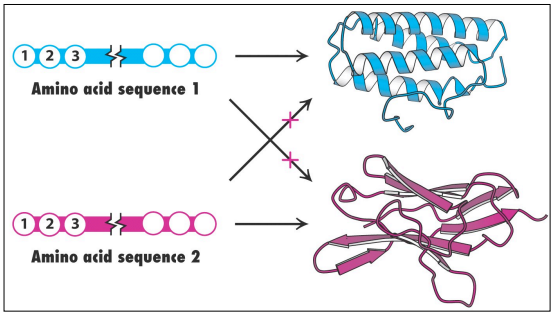
Introduction

- We will build on the concepts that we discussed in Lecture 1
  - How does a linear sequence of of amino acids (polypeptide) produce such a wide variety of 3-dimensional structures and exhibit such a wide range of functions?

Introduction

- We will build on the concepts that we discussed in Lecture 1
  - How a linear sequence of of amino acids (polypeptide) produce such a wide range of 3-dimensional structures exhibiting and a wide range of functions?

Introduction



Questions

Of the interatomic interactions (bonds) that we discussed in Lecture 1, which have energies that are much greater than the thermal energy at room temperature?

Questions

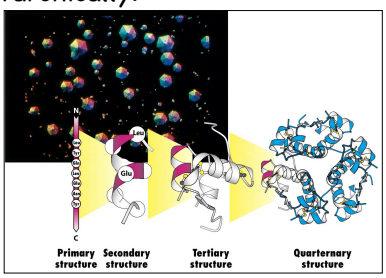
Of the interatomic interactions (bonds) that we discussed in Lecture 1, which have energies that are comparable to the thermal energy at room temperature?

Introduction

- We will consider proteins structure hierarchically:

Introduction

- We will consider proteins structure hierarchically:



Introduction

- Proteins are versatile, they lie at the interface between:
  - the uniform, one dimensional world of the storage of genetic information (DNA), and
  - the the functioning three dimensional world that we live in.

Introduction

- The diversity of structure and function arise from the diversity of the amino acids used to build proteins.
  - structural diversity (size and shape)
  - chemical diversity (reactive functional groups)
  - physical diversity (non-covalent interactions)

Introduction

- Proteins can assemble and work together to produce remarkably complex, molecular machines.
  - The products of billions of years of research and development in the area of nanotechnology (evolution)

Introduction

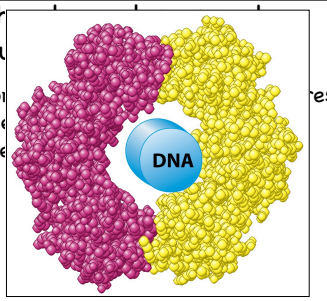
- Proteins can assemble and work together to produce complex, molecular machines.
  - The products of billions of years of research and development in the area of nanotechnology (evolution)

Introduction

The DNA Clamp used in DNA replication

togeth
molecu

- The pr
  and de
  nanote



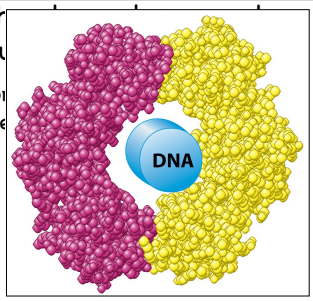
esearch

Introduction

The DNA Clamp used in DNA replication

togeth
molecu

- The pr
  nanote

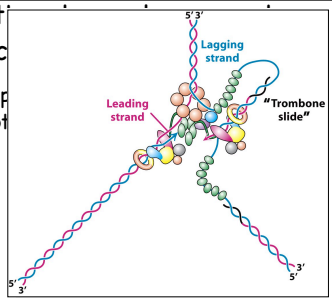


Introduction

The DNA Clamp used in DNA replication

toget
molec

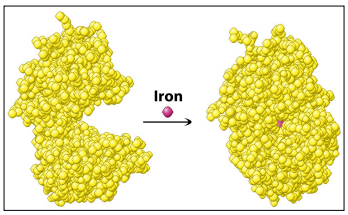
- The p
  nanot



Click for video

Introduction

- Proteins can be flexible when carrying out their functions.



Living Figure Living Figure

Lactoferrin

Introduction

- Proteins can be flexible when carrying out their functions.

Hexokinase

Next up

- A review of the 20 amino acids used to make proteins, and how they differ from one another.
- Protein secondary structure.
- Protein tertiary structure.