Contents

Structure of DNA

- **Type of Molecule:** DNA is a linear polymer.
- **Quantity of nucleotides** :
  - DNA is a linear polymer of millions of nucleotides.
- **Contents:**
  - DNA is a macromolecule.
  - DNA is a long chain of subunits.
  - The subunits of DNA are nucleotides.
- **Composition of DNA** :
  - Sugar
    - DNA is composed of sugar called deoxyribose.
  - Phosphate group
  - Nitrogenous base

  Location: DNA is present in:
  - Nucleus

  - Cytoplasm of prokyarotes
  - Chloroplast
- **Measurement:**
  - DNA is measured in picogram,
  - $1pg = 10^{-12}gm$
- **Quantity of DNA in human:**
  - One human cells contains $5.6pg$ of DNA.
  - The length of DNA in a human cell is $174cm$.

History

Equality

- The amount of purine is equal to amount of pyrimidine base.

$$A = T$$

$$G = C$$

- This is the rule given by Chargaff.
- This rule was given in 1950.

Xray Diffraction

- The study was done by
  - Roselind
  - Maurice Wilkins
- The chemical and physical properties of DNA was determined by this experiment.
- This experiment was done by x-ray diffraction method.

Double Helical Structure of DNA

- The double helical molecular model of DNA was proposed by Watson and Crick.
- The double helical molecular model of DNA was proposed in 1953 .
- This proposal was done on the basis of explanation of chemical data of:
  - Wilkins
  - Franklin
  - Chragaff
- The work for discovery of double helical structure of DNA was awarded a Nobel Prize.
- The Nobel Prize was awarded in 1962.

Characters of double helical structure of DNA

- The DNA is double helical right handed B-DNA.
- **Contents:**
  - DNA consists of two helical strands.
  - The strands are of polynucleotide chains.
  - **Contents of strand:**
    - Phospate Sugar is present as backbone.
      - The bond joining phosphate and sugar is called phosphodiester bond.
  - The strands are joined together by nitrogenous bases.
    - Nitrogenous bases are joined with one another by hydrogen bonds.
    - **Location of nitrogenous bases** :
      - Nitrogenous bases are located inside the strands.
      - Their location is arranged perpendicularly to the long axis of DNA.
- The strands are plectonimically coiled.
- The strands are antiparallel.
  - One strand runs in $5'$ to $3'$ carbon.
  - One strand runs in $3'$ to $5'$" carbon.

Base pairing of nitrogenous bases

The base pairing of nitrogenous bases is very specific.

- **A** *Adenine* pairs with **T** *Thymine*
  - There is presence of only two hydrogen bond between adenine and thymine.
- **G** *Guanine* pairs with **C** *Cytosine*
  - There is presence of three hydrogen bond between guanine and cytosine.

Structural arrangement of DNA

- **Number of base pairs in one complete spiral:** 10
- **Length of one complete spiral:** 34Å
- **Distance between two adjacent base pairs:** 3.4Å
- **Diameter of two strands:** 20Å

Nature of information

- Genetic information is not coded by both strands of DNA.
- One strand codes genetic information.
  - The strand which codes genetic information is called sense strand.
- One strand does not code genetic information.
  - The strand which does not code genetic information is called non sense strand.