U6y. sem - VI
MJC - 11 (T)
Unit - 3

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DNA double Helix

The DNA double helix is the secondary structure of DNA in which two nucleotides strands coil around each other forming a twisted ladder-like shape.

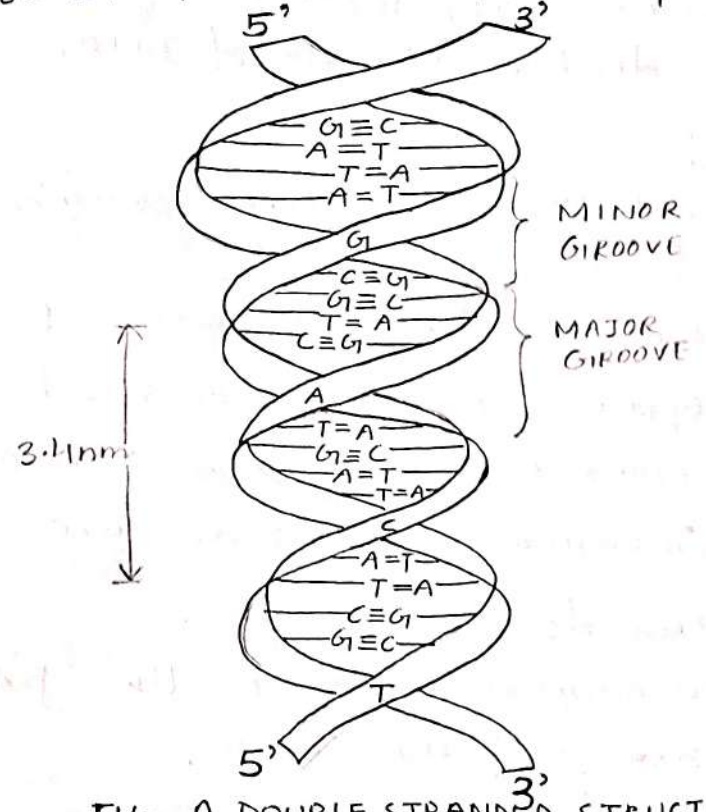

FIG. A DOUBLE STRANDED STRUCTURE OF DNA.

Discovery / Model

- Proposed by James Watson and Francis Crick [1953]
- They were awarded the Nobel Prize in 1962 for this discovery.
- The structures resembles a twisted ladder, known as a double helix.

Structural features:

- DNA consists of two sugar - phosphate strands placed next to each other.
- The strands run in opposite (antiparallel) directions.
- The strands intertwine around a central axis forming the helix.
- Structure is uniform in shape and size in almost- all living organisms.
- This conformation is the most energy - favourable for double - standard DNA.

Base Pairing:

Nitrogen bases pair specifically through hydrogen bonds:

Adenine (A) = Thymine (T) → 2 hydrogen bonds

Cytosine (C) ≡ Guanine (G) → 3 hydrogen bonds

→ Each pair contains one purine and one Pyrimidine, maintaining equal distance between the strands.

→ Bases are arranged like step - like pairs, forming the rungs of the ladder.

→ Because of ~~the~~ complementary pairing, one strands determines the sequence of the other.

Additional structural characteristics:

- The helix contains major and minor grooves.
- Major grooves serve as important binding sites for proteins that regulate DNA functions.
- The double helix cannot exist without proper antiparallel base pairing.