FACULTY OF ENGINEERING &TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

THE STRUCTURE OF NUCLEIC ACID CHAINS

- To form polynucleotides of either DNA or RNA , nucleotides are linked together by covalent bond between the phosphate groups. These phosphate linkage are called phosphodiester bonds.

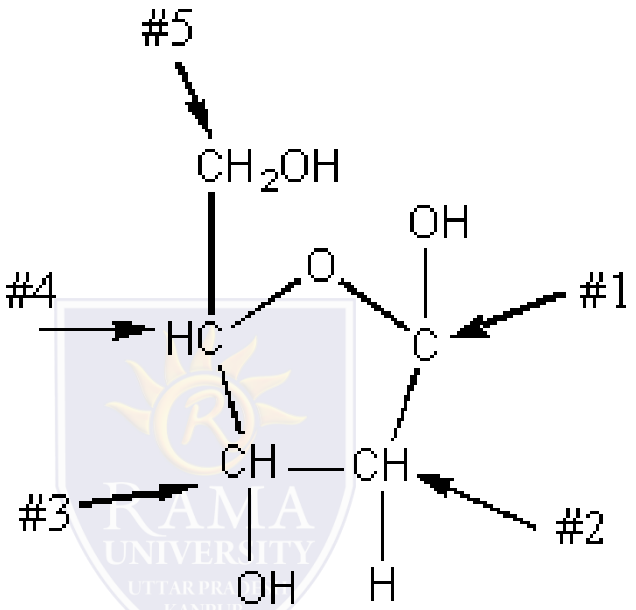
- Nucleotides are joined together in DNA and RNA by ***phosphodiester bonds*** between the phosphate component of one nucleotide and the hydroxyl component in the sugar molecule of the next nucleotide.

- An ester bond is a bond which occurs between a Carbon atom and an Oxygen atom.

- More and more nucleotides can be added on by the same process of forming ester bonds until an immense chain is formed.

- But no matter how long a polynucleotide chain is, one end of the nucleic acid molecule always has a free -OH group on the sugar at the Carbon known as C3' (called the ***3' end***) and the other end of the molecule always has a phosphate group at C5' (the ***5' end***).

- The Carbons get this name from a counting system illustrated in the next diagram.



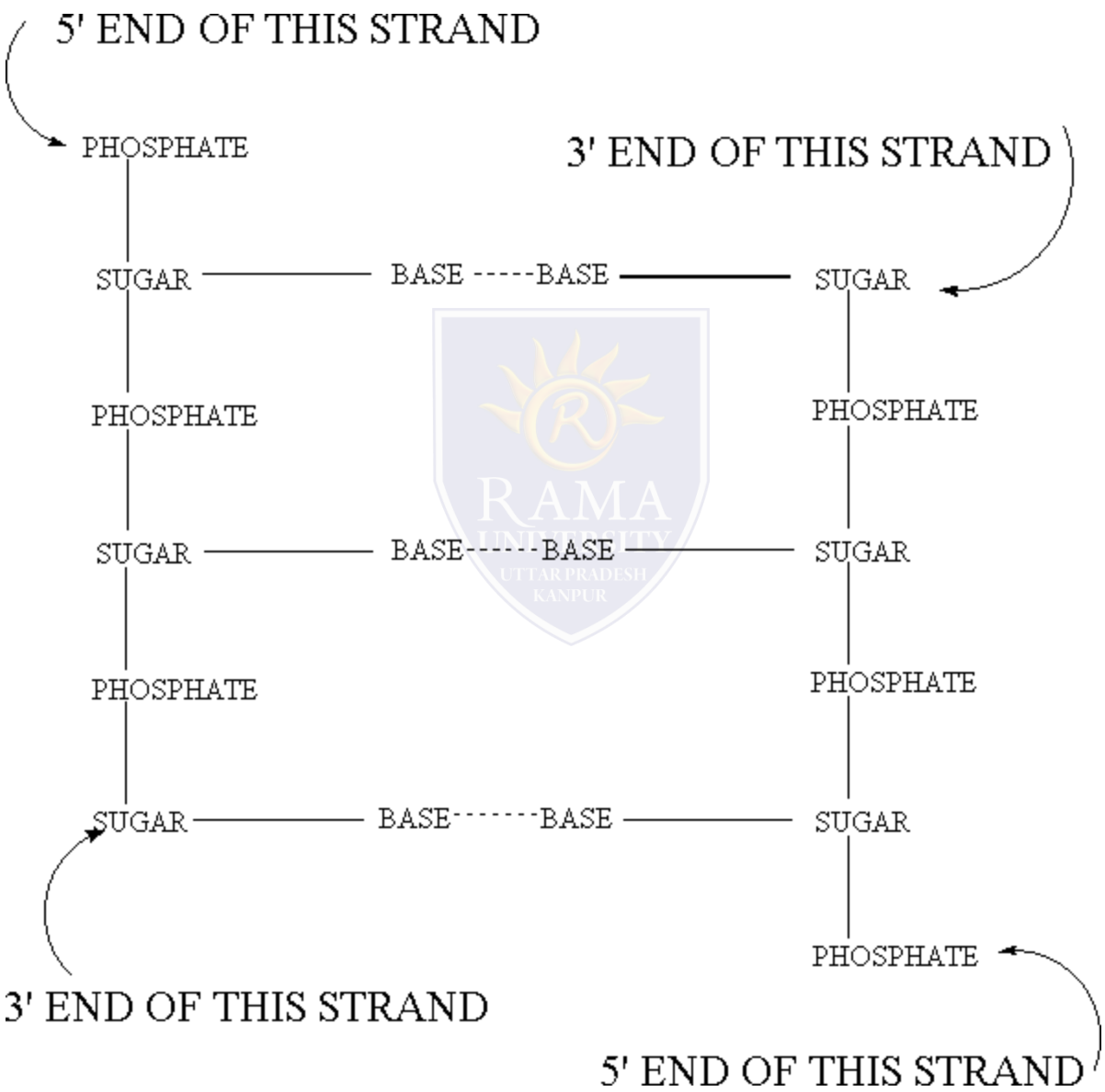
- This "counting system" allows the strand of nucleic acid to be oriented: the 5' end of the molecule always ends with a phosphate and the 3' end of the strand always ends with a sugar.

- In 1953 James Watson and Francis Crick proposed a model for the physical and chemical structure of the DNA molecule.

- According to the ***Watson-Crick model***, a DNA molecule consists of two polynucleotide strands coiled around each other in a helical manner - "twisted ladder" structure.

- The sugar-phosphate backbone is on the outside of the ***double helix***, and the bases are on the inside, so that a base on one strand points directly toward a base on the second strand.

- The two strands of the DNA double helix run in opposite directions, one in the 5' to 3' direction, the other in the 3' to 5' direction. The term that describes how the two strands relate to each other


5' END OF THIS STRAND
PHOSPHATE
3' END OF THIS STRAND
SUGAR
BASE
BASE
SUGAR
PHOSPHATE
PHOSPHATE
SUGAR
BASE
BASE
SUGAR
PHOSPHATE
PHOSPHATE
SUGAR
BASE
BASE
SUGAR
PHOSPHATE
3' END OF THIS STRAND
5' END OF THIS STRAND