

NUCLEIC ACIDS

Nucleic acids are another most important macromolecules present in the cells of all living organisms as nucleoproteins. Nucleoproteins are made up of proteins combined with another biopolymer called nucleic acid.

→ It is (Nucleic acids) ^{are} Long thread-like macromolecules of high molecular mass.

→ First isolated by F. Meischer (1868) from the nuclei of Pus cells.

→ He named it "nuclein" because it was found in the ^{H₀} cell nucleus.

→ This discovery later led to the identification of DNA and RNA.

Oswald Avery (1944) was the first to point out that "Nucleic acid is the carrier of genetic information".

→ Nucleic acids are responsible for the transmission of hereditary characters (i.e. genetic information from parents to their offsprings) and for the biosynthesis of proteins.

→ Nucleic acids govern the metabolic activity in living organisms.

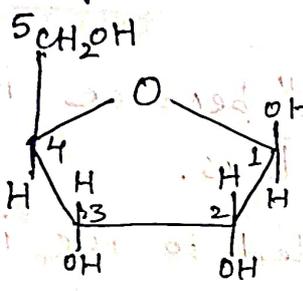
Components of Nucleic acids

Nucleic acids contain the following three constituents.

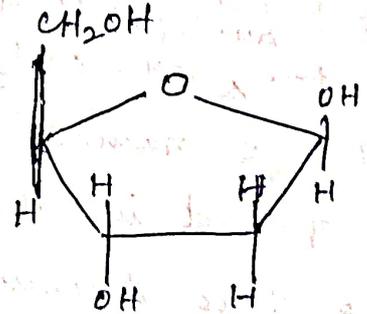
- 1.] A pentose sugar (ribose or deoxyribose),
- 2.] A nitrogen containing heterocyclic base: a purine or a pyrimidine base,
- 3.] A phosphate group.

[1] Sugar Units in Nucleic acids

The structure of the two pentose sugars (5 carbon sugar) present in the nucleic acids are given below:



β -D-Ribose
(used in RNA)

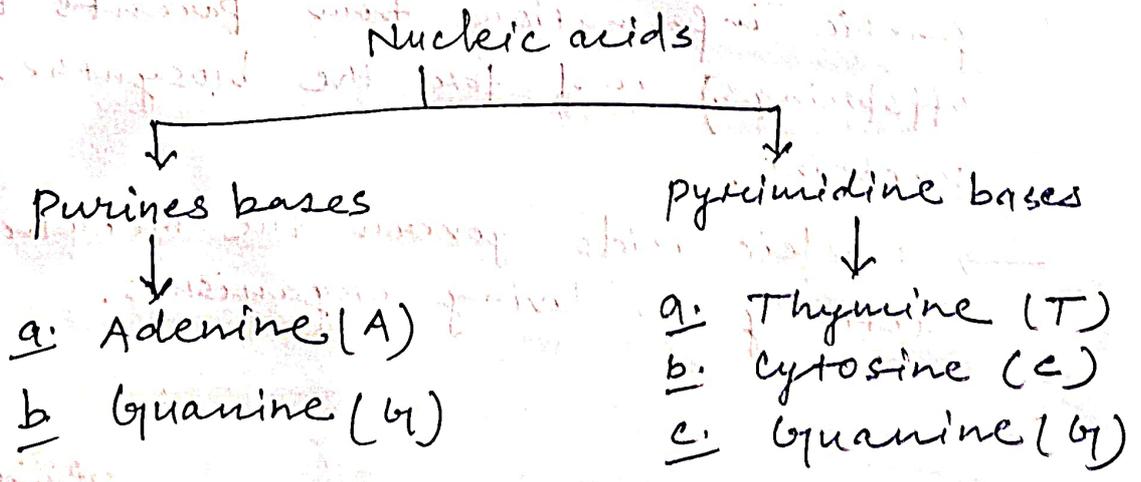


β -D-2-Deoxyribose
(used in DNA)

Both these sugars can exist in α - and β -form

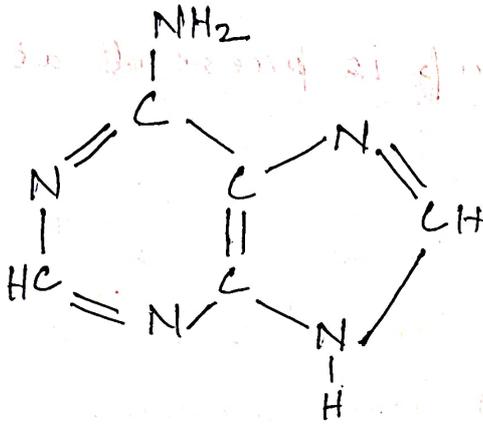
[2] Nitrogen Bases in Nucleic Acids

There are two types of bases in nucleic acids.

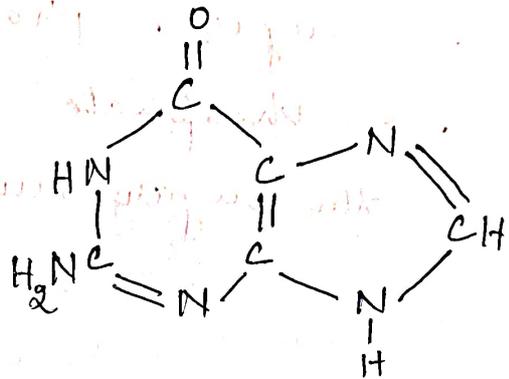


The structural formulae of these bases are:

Purine bases

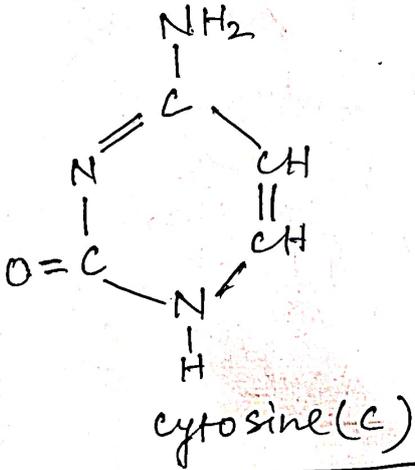


Adenine (A)

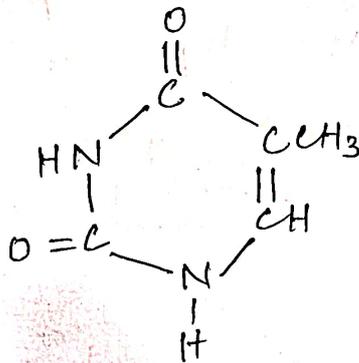


Guanine (G)

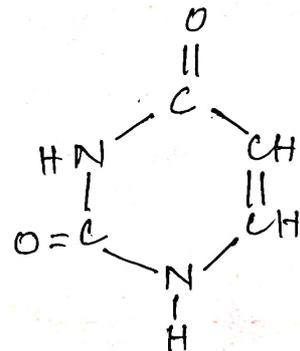
Pyrimidine bases



Cytosine (C)



Thymine (T)



Uracil (U)

There are two types of Nucleic acids: —

1. Deoxyribonucleic acid (DNA)
2. Ribonucleic acid (RNA)

Bases present in

DNA :

Purines :

Adenine (A) Guanine (G)

Pyrimidines :

Cytosine (C) Thymine (T)

Purines :

Adenine (A) Guanine (G)

RNA :

Pyrimidines :

Cytosine (C) Uracil (U)

[3] Phosphate Group:

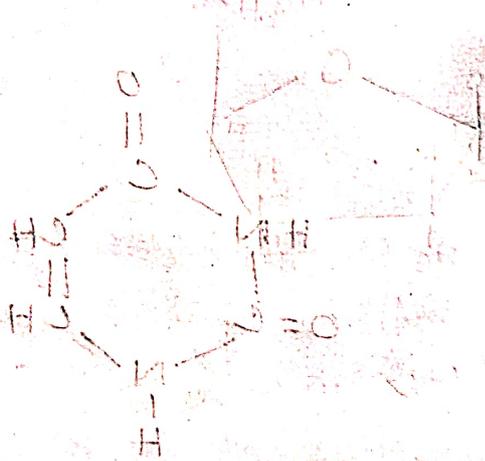
- derived from phosphoric acid (H_3PO_4)
- Links sugars together forming the sugar - phosphate backbone.

→ phosphate group is present at 5C of the sugar unit.

4.

(U) Uracil

(A) Adenine



(U) Uracil

(T) Thymine

(C) Cytosine

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