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B.Sc - I. (Zoology '2021)

Paper - C-8

Nucleic acids

These are important organic substances found in nucleus & cytoplasm. They control the important biosynthetic activities of the cell and carry hereditary information from generation to generation. They are associated with the chromosomes & transmit various information to cytoplasm. These nucleic acids are of two types:

(i) Deoxyribonucleic acid (DNA) & (ii) ribonucleic acid (RNA)

Both types of nucleic acids are the polymers of the nucleotides.

A nucleotide is made of nucleoside and phosphoric acid.

The nucleoside is formed of the pentose sugars (Ribose or deoxyribose) & nitrogen bases (Purines & Pyrimidines).

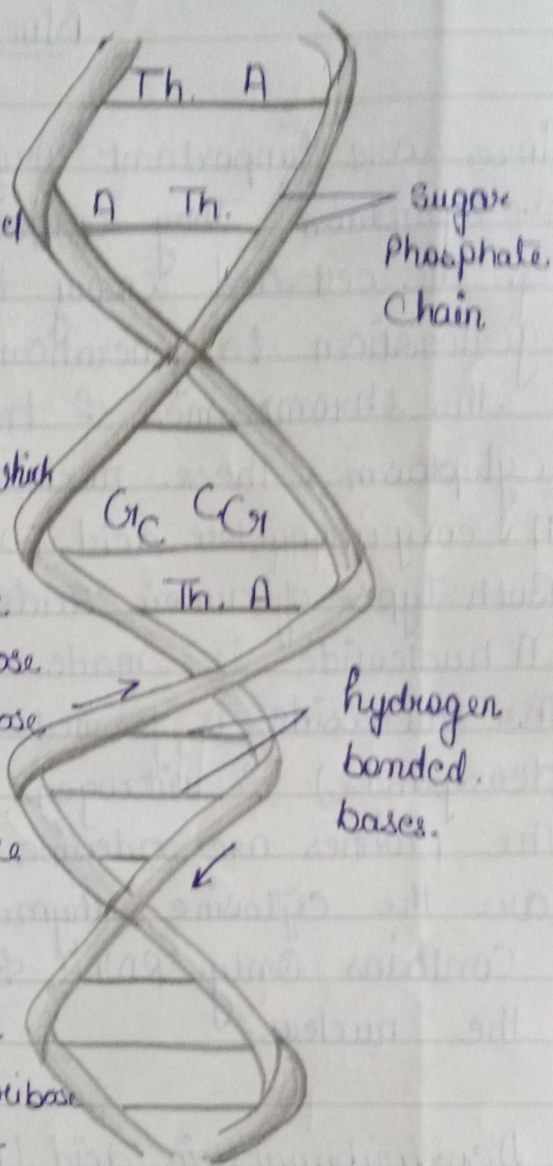
The purines are adenine & guanine & the pyrimidines are the cytosine, thymine & uracil. The cytoplasm

contains only RNA, & DNA is exclusively found in the nucleus.

1. Deoxyribonucleic acid (DNA) :- It forms about 1% part of nucleus as found by spectrophotometric analysis. Chemically it consists of mainly three components: Phosphoric acid, sugar & bases.

(a) Phosphoric acid :- It may occur also as phosphate & forms the backbone of DNA molecule along with sugar molecule. It links the nucleotides by joining the deoxyribose (pentose sugar) of two adjacent nucleotides with an ester-phosphate bond.

These bonds connect carbon 3' in one nucleoside with carbon 5' in next. This acid is a channel for the chemical energy used by the molecules.



(b) Sugar:- It is Pentose type which in DNA molecule shows the absence of one oxygen molecule from carbon-2 position of ribose sugar. Both deoxyribose & ribose (Pentose sugars of nucleic acids) have a pentagonal ring with five carbons, among which two (i.e. 3' & 5') are attached to phosphoric acid & three (1') to the base. This sugar is called deoxyribose & it simply acts as a support column to which bases are attached.

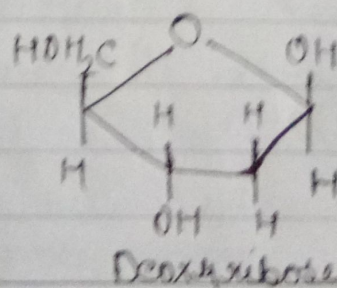
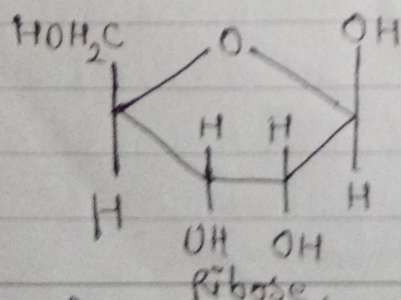
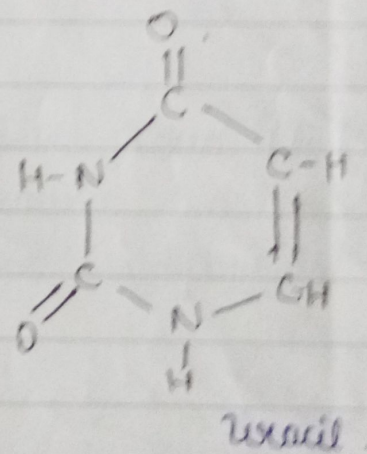
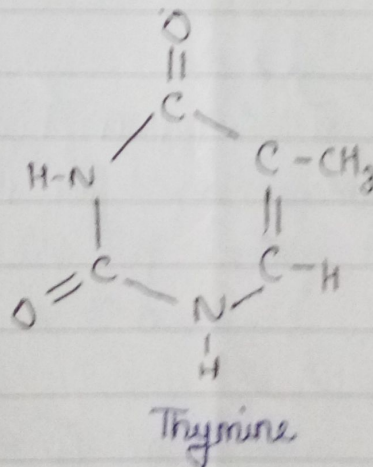
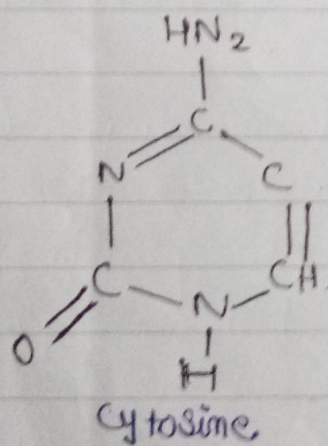
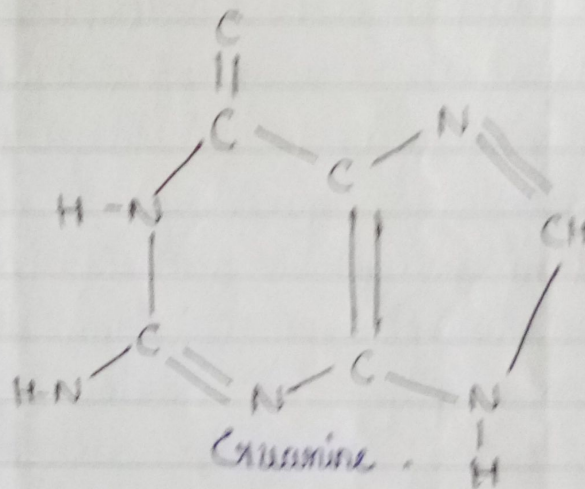
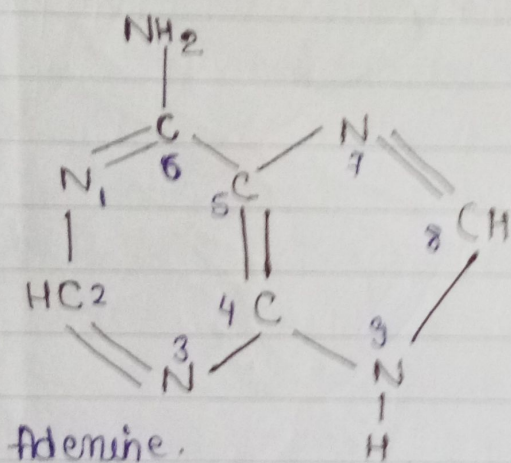
fig. Double helical model of DNA.

(C) Bases. These may be of two types - Purines & Pyrimidines.

Purines are characterised by the presence of two carbon rings. They may be adenine (A) & guanine (G) while their corresponding nucleotides will be deoxyadenylic acid & deoxyguanylic acid.

Their corresponding nucleosides (base + sugar) are deoxyadenosine & deoxyguanosine.

Pyrimidines are characterized by the occurrence of single benzene ring. They are thymine (Th) & cytosine (C) & their corresponding nucleosides will be deoxythymidylic acid & deoxycytidylic acid. Likewise their nucleosides are deoxythymidine & deoxycytidine.



Chemical Formulae of Bases & Sugars.