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B.Sc-I (Zool Hons)

Paper-I B

Chromosomes

Dr. Pritam Kr
Deptt of Zoology,
Sershah College, Sasaram
V.K.S. University, Ara.

(II) The Satellite and Constriction are Constant in shape and size for a particular chromosomes.

(III) The chromosomes bearing Satellite are known as SAT- chromosomes.

(IV) In human Satellite are present in the arms of 13, 14, 15, 21 and 22nd Chromosomes.

Certain regions of chromosomes remain more Condensed and stain more deeply. These heavily staining Chromosomal parts are named hetero chromatin whereas non Condensed and less stained parts during the same phase of Cell division are known as Euchromatin.

FINE STRUCTURE OF CHROMOSOMES

(I) Chromosomes are Composed of nucleoprotein in the form of chromatin.

(II) The nucleoproteins forming chromatin are Composed of nucleic acid in the form of DNA and proteins in the form of histones.

(III) The latter are present in five forms, namely H_1, H_{2A}, H_{2B}, H_3 and H_4.

R.D. Kornberg and J.D. Thomas proposed nucleosome model in 1974 to explain the arrangement of DNA and histones Constituents in the structure of chromatin.

This model proposes that nucleosome is the unit of chromatin structure. Each nucleosome is an ellipsoidal bead like structure which measures about 110 A° in diameter and 60A° in height.

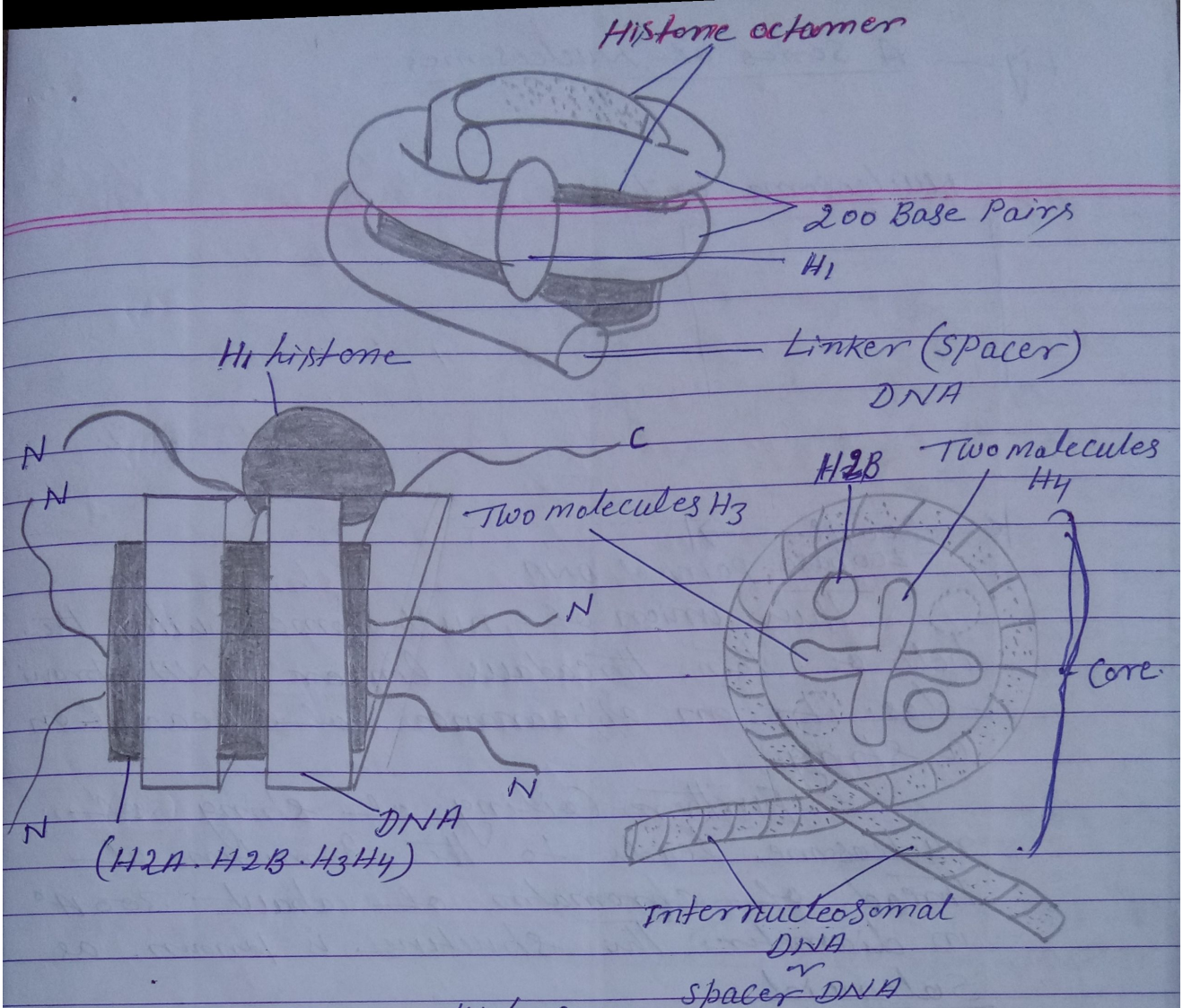


Fig:— Nucleosome

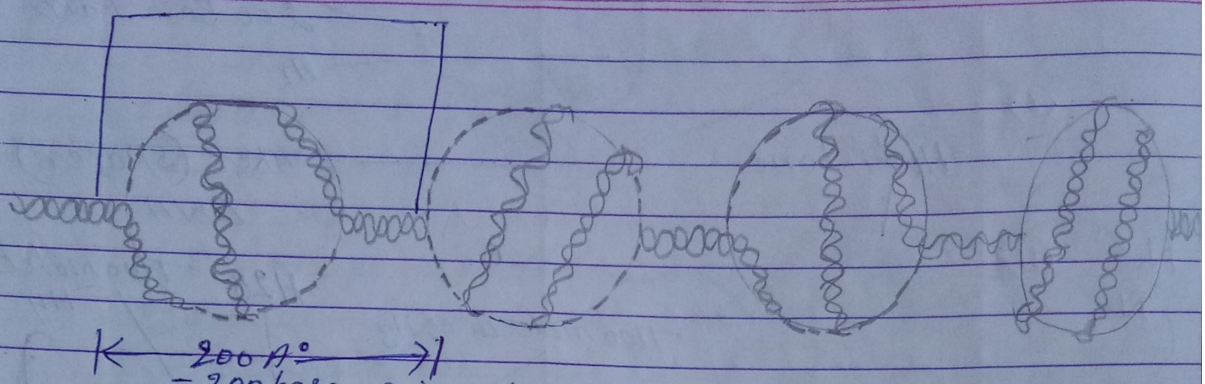
Each nucleosome is formed by two turns of DNA double helix around an octamer core of histones. Each turn of DNA double helix covers a length of about 83 base pairs whereas an octamer is formed by eight molecules of histones —— two molecules of each type of H_{2A}, H_{2B}, H_3 and H_4.

These remain arranged in two tiers, each comprised of four molecules.

Nucleosomes are joined together by thin thread like structure composed of linker DNA of variable length.

Histone H_1 forms covering around the DNA strand.

Fig:— A Series of Nucleosomes.



Thus union of nucleosomes with the help of thin threadlike linker DNA provides it an appearance of beads-on a string.

Further Coiling of string of nucleosome leads to the formation of thread of chromatin of about 300 A° in diameter. This structure is known as Solenoid.

FUNCTIONS OF CHROMOSOMES:

(i) The chromosomes Control the physiological activities of the organisms.
(ii) These Control the development and differentiation of the organisms.
(iii) The heterochromatic regions of the chromosomes impart in the formation of nucleolus.
(iv) The change in the number of chromosome lead to be appearance of different characters.