

Euchromatin and Heterochromatin

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Introduction

Chromatin Structure

- Chromatin is composed of DNA and proteins, mostly basic proteins called Histones
- That help chromatin fold so it can pack into the tiny volume of a cell's nucleus
- The two basic types of chromatin are-
 1. Euchromatin
 2. Heterochromatin

- The term heterochromatin and euchromatin was coined by Emil And Heitz in 1928.
- Heterochromatin and euchromatin are the parts of the chromatin.
- DNA protein complex found in eukaryotes.
- These were take part protection of DNA inside the nucleus.

WHAT IS CHROMATIN ?

- Chromatin is the complex combination of DNA and proteins that makes up chromosomes. It is found inside the nuclei of eukaryotic cells.
- The function of chromatin are:-

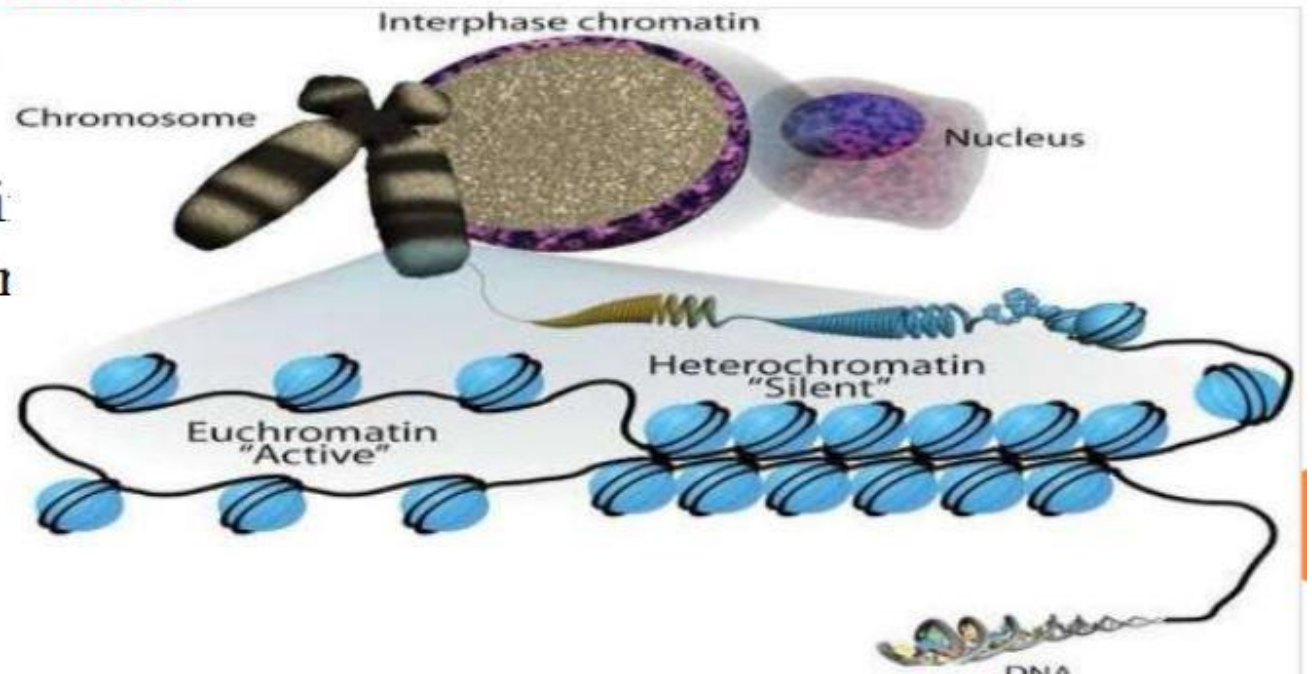
To package DNA into a smaller volume to get in the cell to strengthen the DNA to allow mitosis and meiosis.

TYPES OF CHROMATIN

1.Euchromatin 2.Heterochromatin

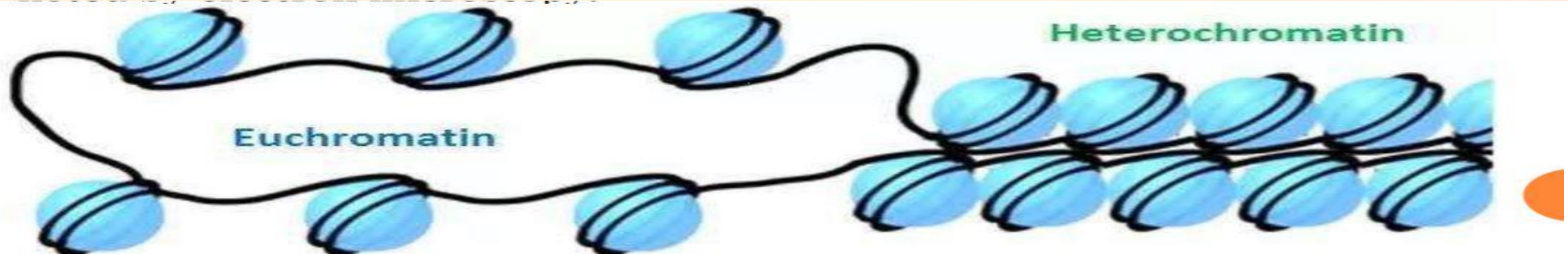
Heterochromatins are two types:-

- 1.Constitutive heterochromati
2. Facultative heterochromati



EUCHROMATIN

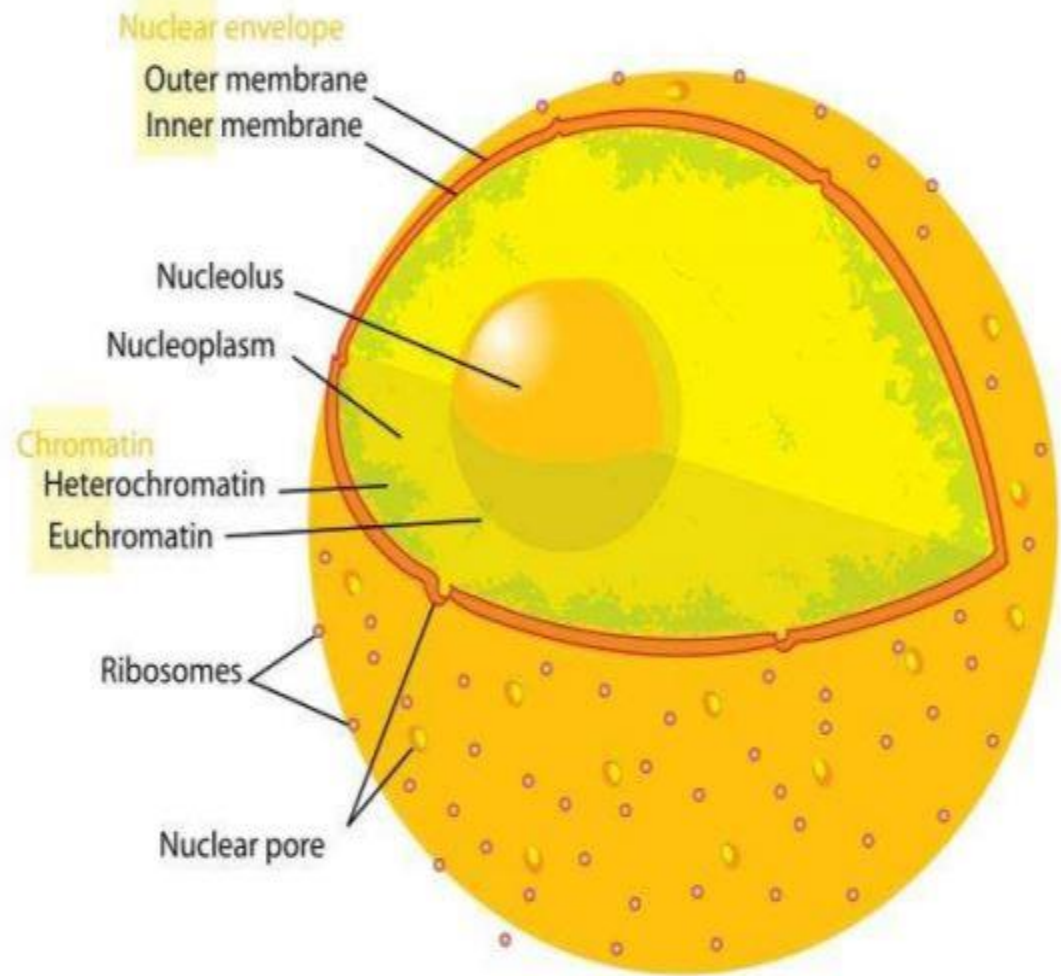
- Euchromatin is the lightly packed form of chromatin that is rich in gene concentration.
- It is often under active transcription.
- Euchromatin comprises the most active portion of the genome within the nucleus, 92% of the human genome is euchromatic.
- The structure of Euchromatin is reminiscent of an unfolded set of beads represent Nucleosomes, Nucleosomes consist of eight proteins known as Histones, with approximately 147 base pairs of DNA wound around them.
- In Euchromatin the wrapping is loose so that the raw DNA may be accessed.
- The basic structure of Euchromatin is an elongated, open 10nm micro fibril, as noted by electron microscopy.
- Euchromatin participates in the active transcription of DNA to mRNA products.



HETEROCHROMATIN

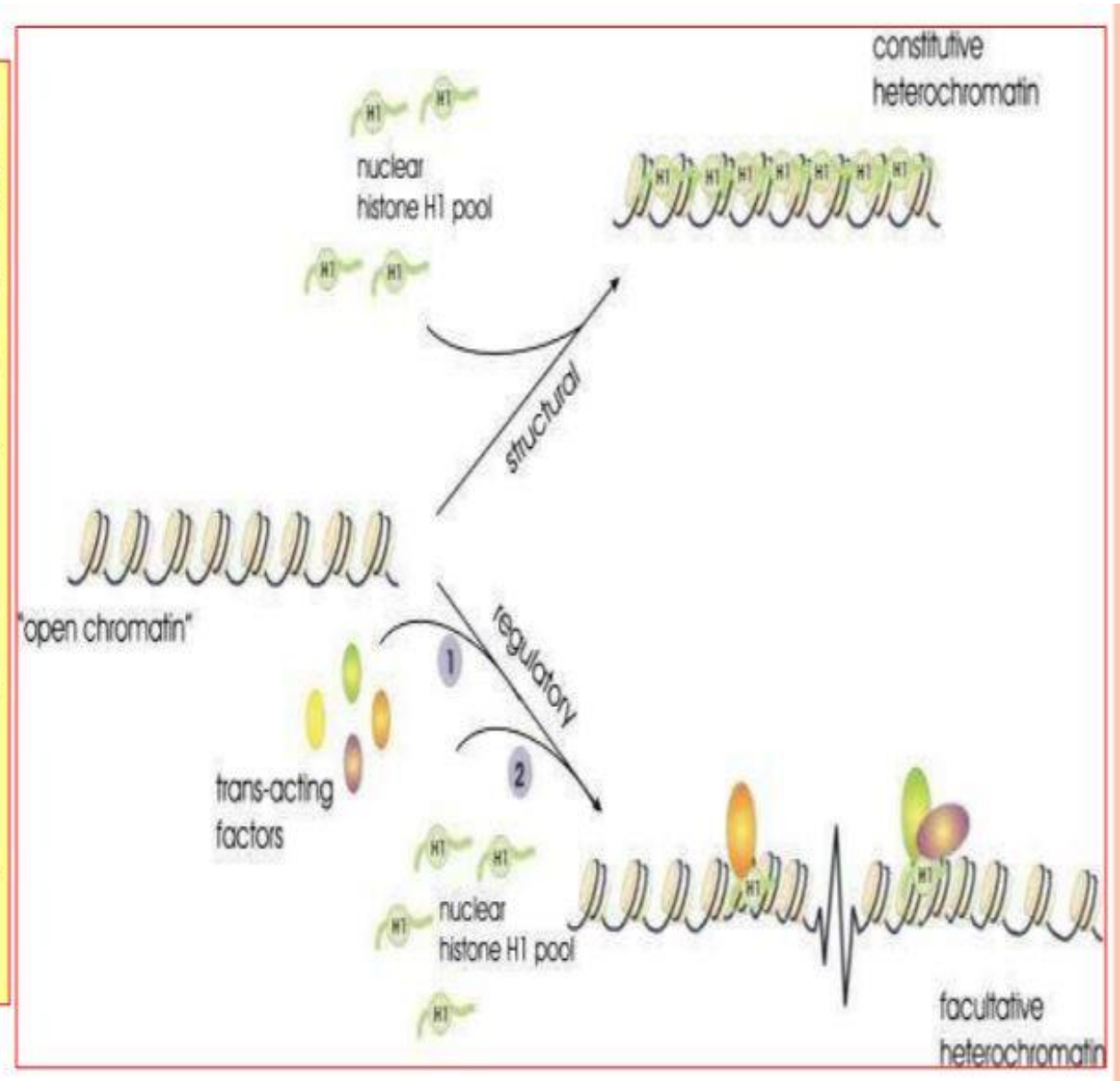
- The regions of the chromosome that appear relatively condensed and stained deeply with DNA specific stains.
- It is tightly packed form of DNA.
- There are two types of heterochromatin, Constitutive heterochromatin and Facultative heterochromatin.
- Both of the constitutive heterochromatin and facultative heterochromatin play a role in the expression of genes.
- Transcriptionally inactive.
- Facultative heterochromatin is the result of genes that are silenced through a mechanism such as Histone methylation or siRNA through RNAi.
- Constitutive heterochromatin is usually repetitive and forms structural functions such as centromeres or telomeres.

- Heterochromatin is a tightly packed form of DNA or condensed DNA, which comes in multiple varieties. These varieties lie on a continuum between the two extremes of constitutive heterochromatin and facultative heterochromatin. Both play a role in the expression of genes.



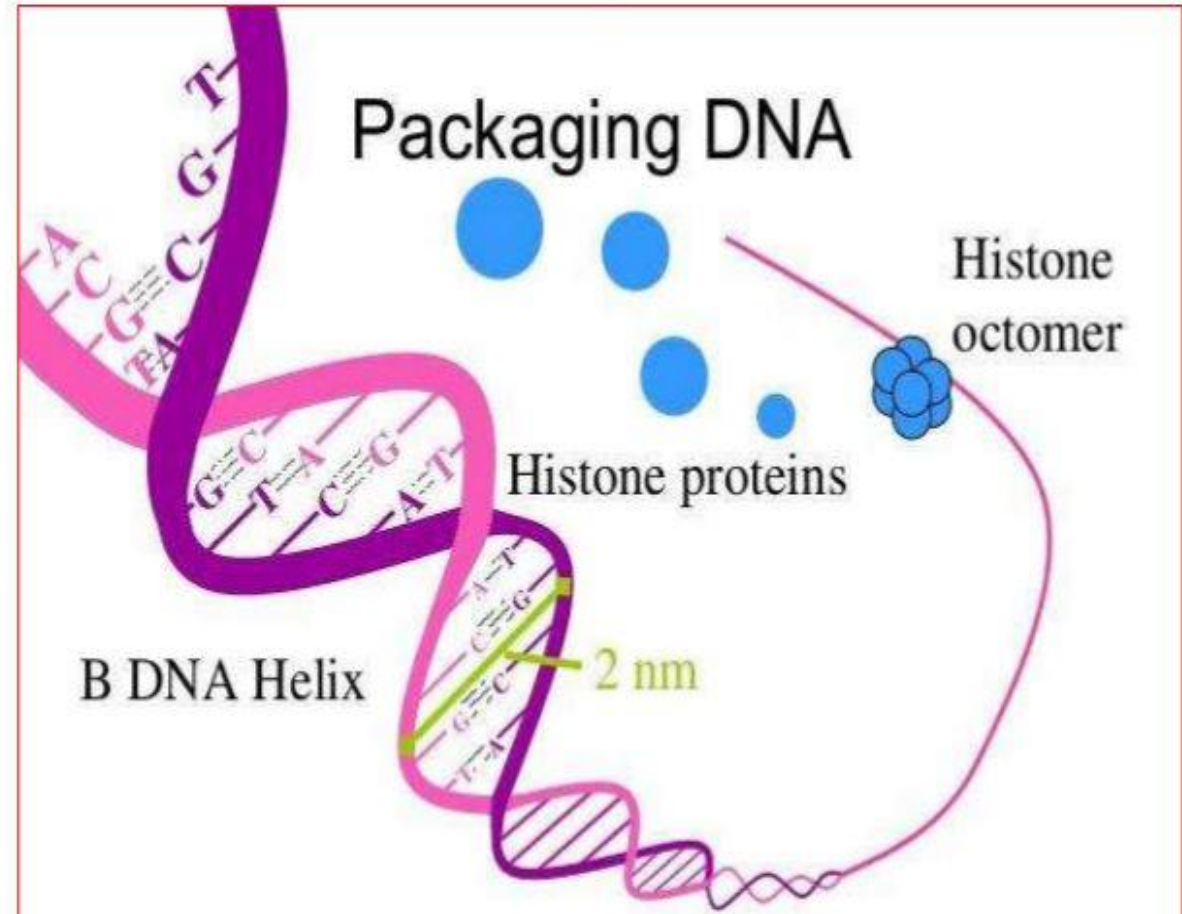
b) Facultative Heterochromatin

- In contrast facultative heterochromatin consists of euchromatin that takes on the staining and compactness characteristics of heterochromatin during same phase of development.
- The inactive x-chromosomes is made up of facultative heterochromatin.
- It may convert to euchromatin depending upon requirement.



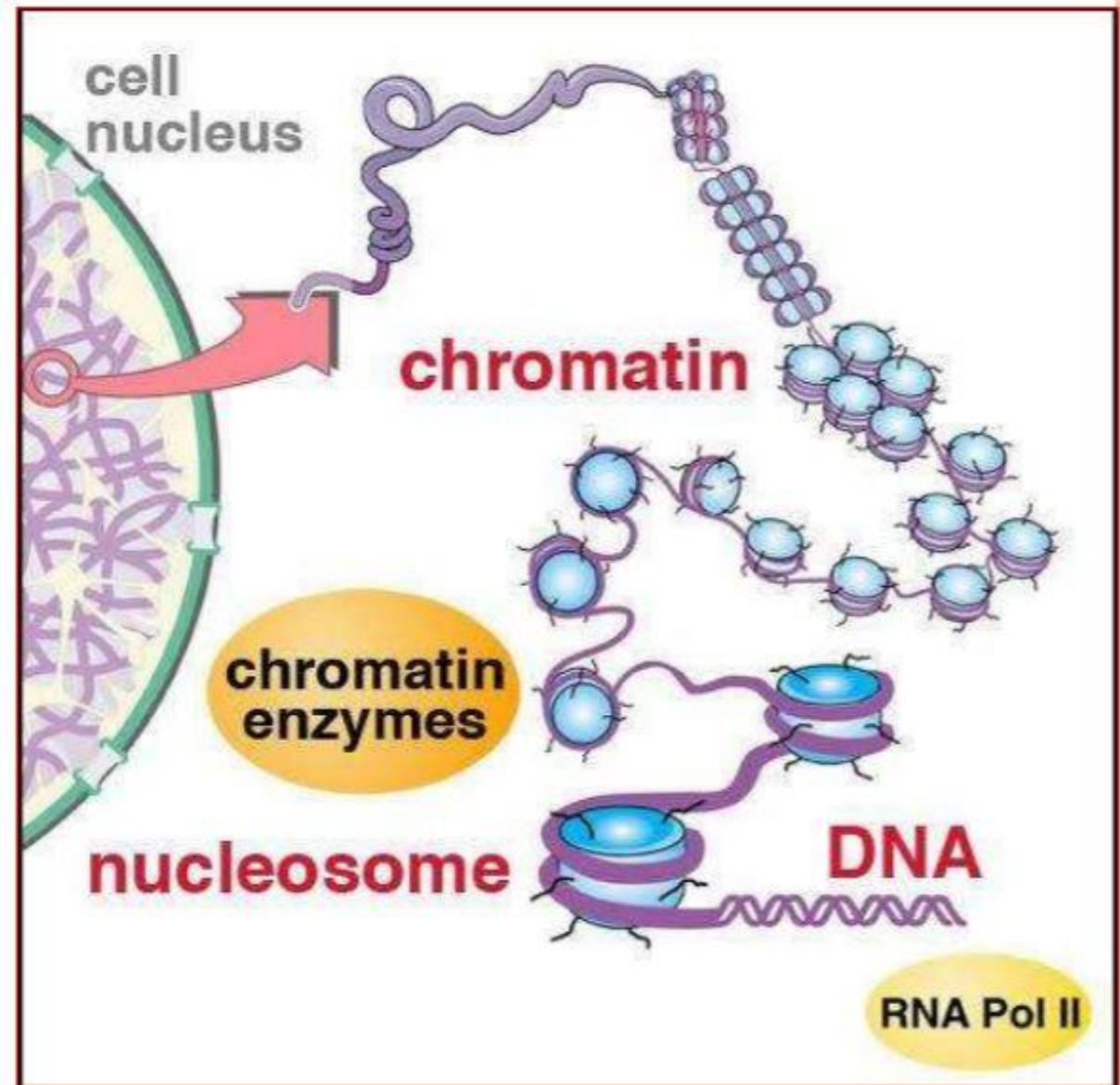
DNA PACKAGING

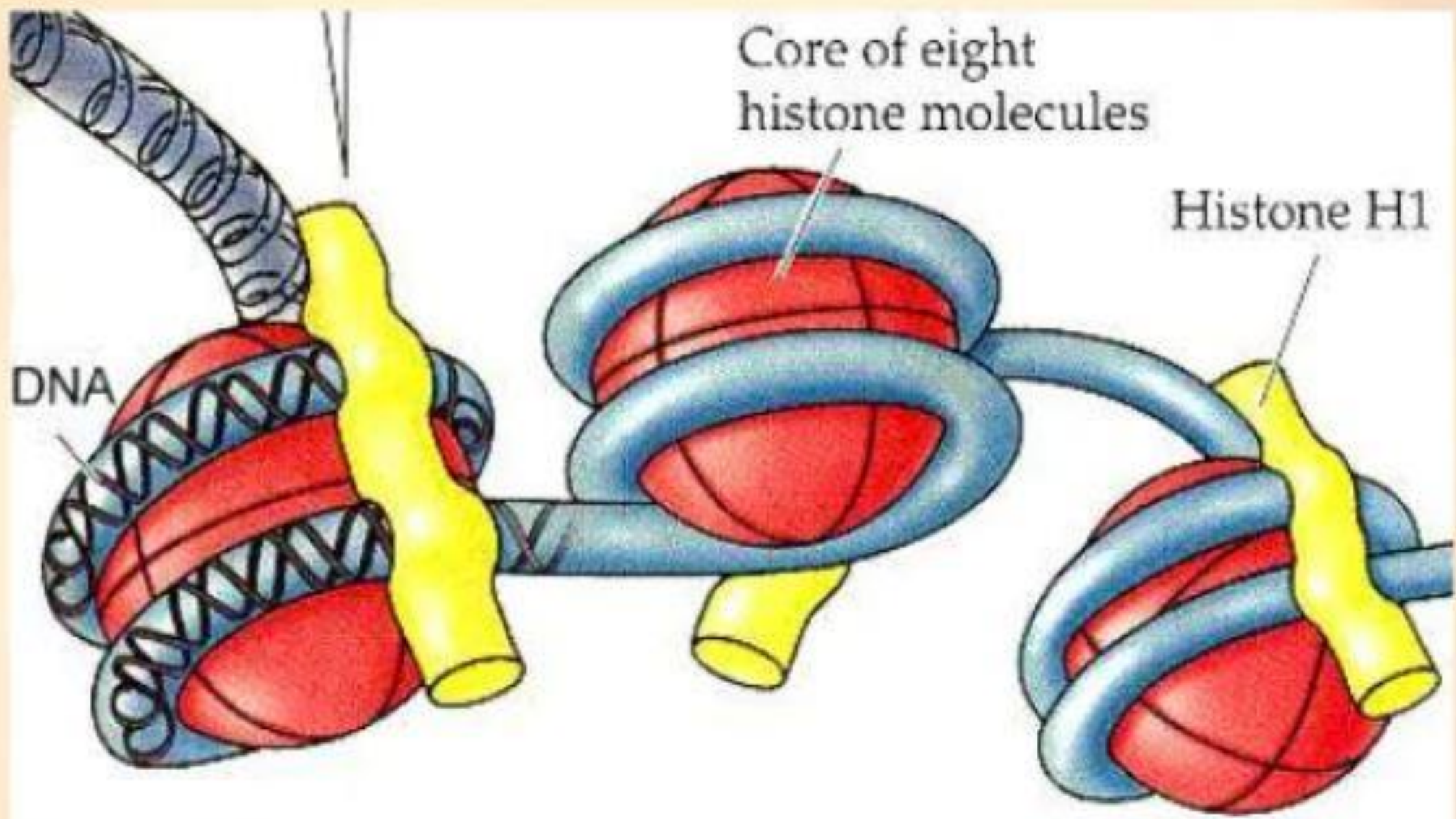
- Electronic micrographs show unfolded chromatin and they look like beads on a string.
- These beads are referred to as nucleosomes (The basic unit of DNA packing) and the string is DNA.



The Nucleosome and DNA Packaging

- The nucleosome is a piece of DNA wound around a protein core.
- The DNA histone association remains intact throughout the cell cycle.
- Histone only leave the DNA very briefly during DNA replication.





Core of eight histone molecules

Histone H1

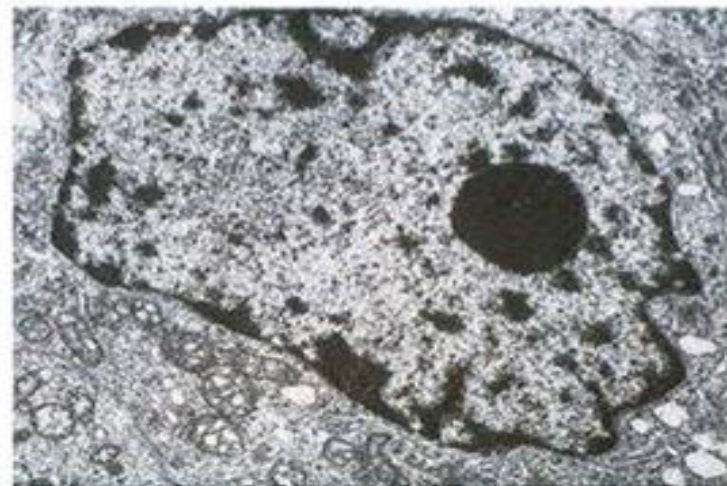
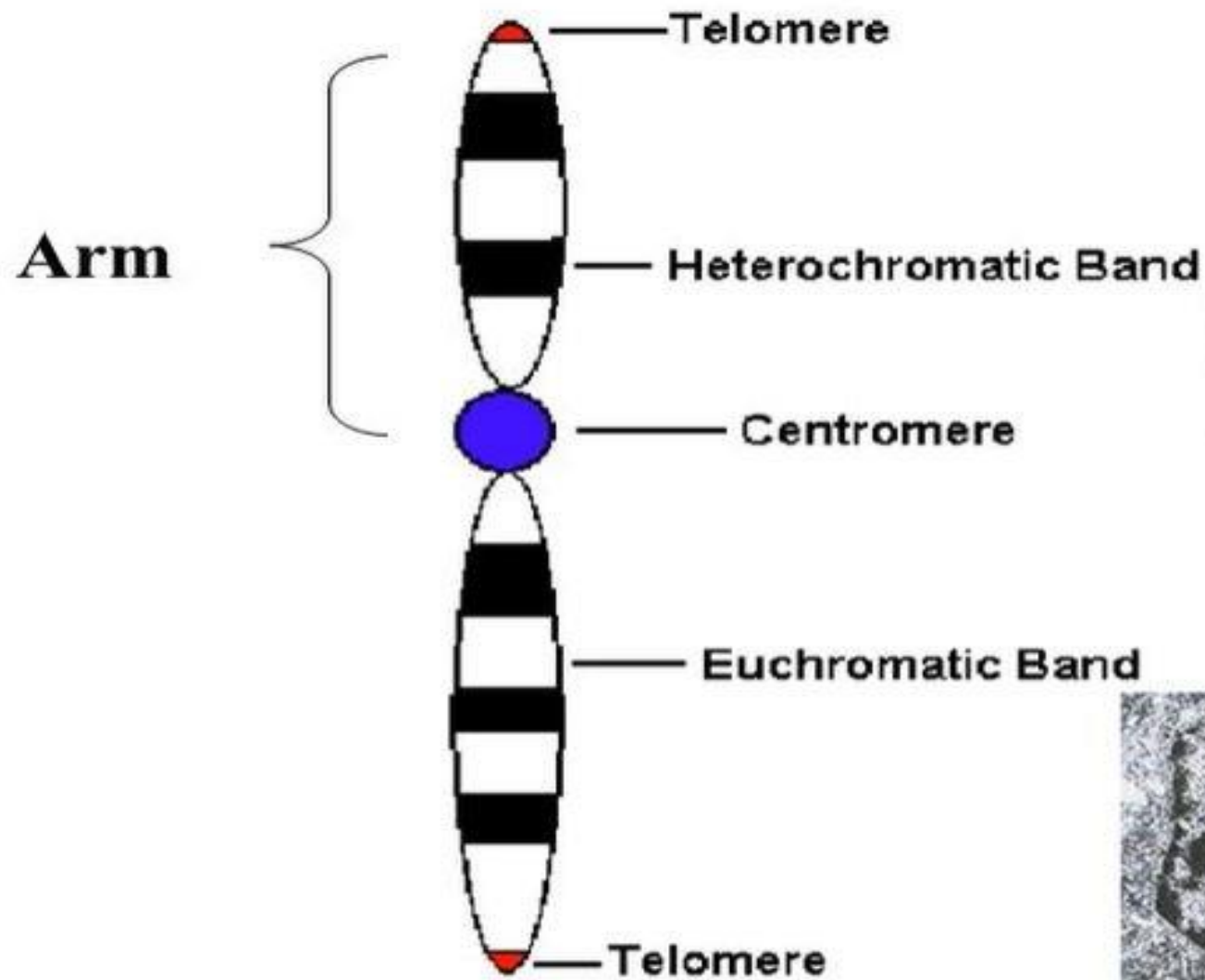
DNA

DIFFERENCE BETWEEN EUCHROMATIN AND HETEROCHROMATIN

	EUCHROMATIN	CONSTITUTIVE HETEROCHROMATIN	INTERCALARY HETEROCHROMATIN
RELATION TO BANDS	IN R-BANDS	IN C-BANDS	IN G-BANDS
LOCATION	CHROMOSOME ARMS	USUALLY CENTROMERIC	CHROMOSOME ARMS
CONDITION DURING INTERPHASE	USUALLY DISPERSED	CONDENSED	CONDENSED
GENETIC ACTIVITY	USUALLY ACTIVE	INACTIVE	PROBABLY INACTIVE
RELATION TO CHROMOSOMES	INTERCHROMOMERIC	CENTROMERIC CHROMOSOMES	IINTERCALARY CHROMOSOMES

- Heterochromatin vs. Euchromatin
 - Heterochromatin is DNA which tends to be highly compacted and dark staining.
 - Euchromatin is not so compacted or dark.
 - The number of genes in heterochromatin is generally small relative to euchromatin.
 - Heterochromatin lacks genes or they are inactive
- Much heterochromatin is found in certain structural parts of the chromosomes: centromeres and telomeres. Also, much of Y chromosome.
 - Move euchromatin to an area next to heterochromatin and it becomes heterochromatin: position effect.
- Base sequences are obviously different from one organism to another, but overall DNA composition can differ as well.
- In most eukaryotic organisms, DNA composition is not uniform across all the DNA in the cell: patches within the same cell where DNA composition is distinct from other regions.

Chromosome structure



CONCLUSION

- From these of the chromatin information and structures and types Euchromatin, Constitutive heterochromatin and Intercalary heterochromatin, presumably the only chromatin involved in transcription is Euchromatin.
- Constitutive heterochromatin surrounds the centromere and is rich in satellite DNA. Intercalary heterochromatin is dispersed. Thus it becomes apparent that the Eukaryotic chromosome is a relatively complex structure.

Thank You.....