



# HETEROCHROMATIN AND EUCHROMATIN

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# INTRODUCTION

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

# HETEROCHROMATIN

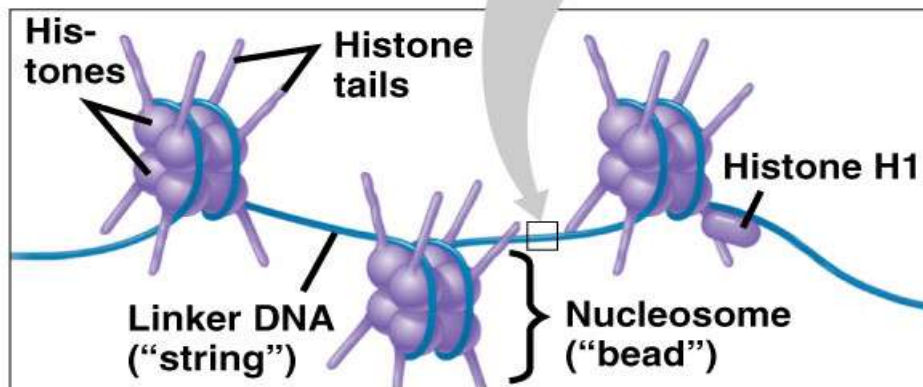
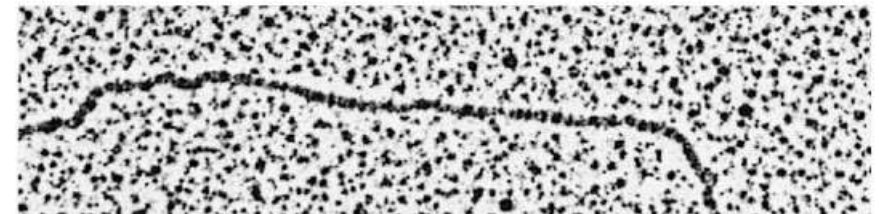
- The regions of the chromosome that appear relatively condensed and stained deeply with DNA specific stains.
- It is tightly packed form of DNA.
- There are two types of heterochromatin, Constitutive heterochromatin and Facultative heterochromatin.
- Both of the constitutive heterochromatin and facultative 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.

# EUCHROMATIN

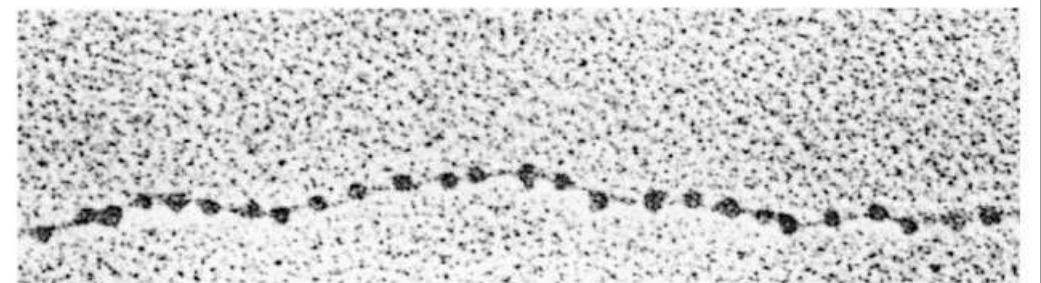
- Euchromatin is the lightly packed form of chromatin that is rich in gene concentration.
- It is often under active transcription.
- Euchromatin comprises the most active portion of the genome within the nucleus, 92% of the human genome is euchromatic.
- The structure of Euchromatin is reminiscent of 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.

# DNA PACKAGING

- Electron 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.



10 nm

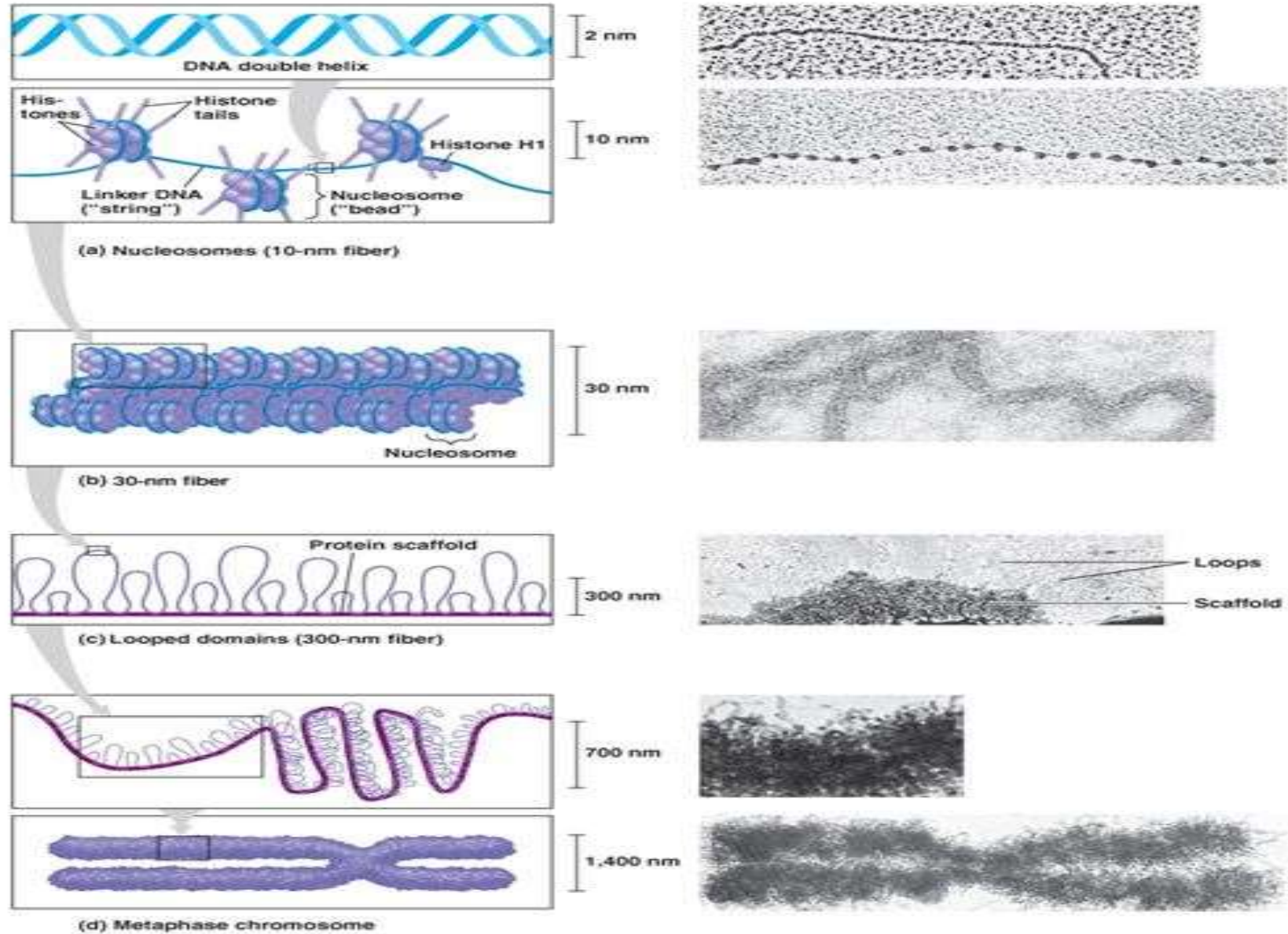


(a) Nucleosomes (10-nm fiber)

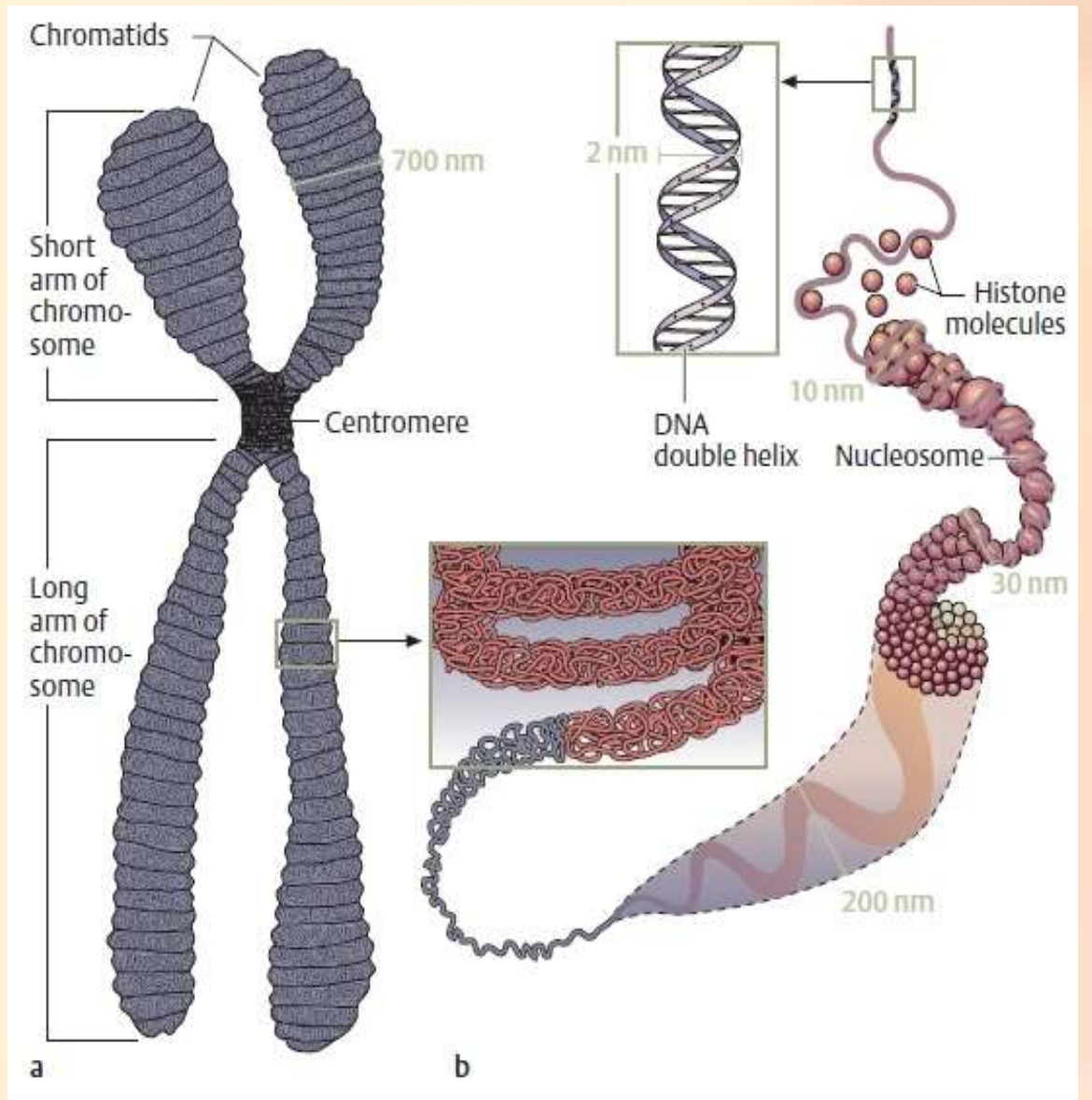
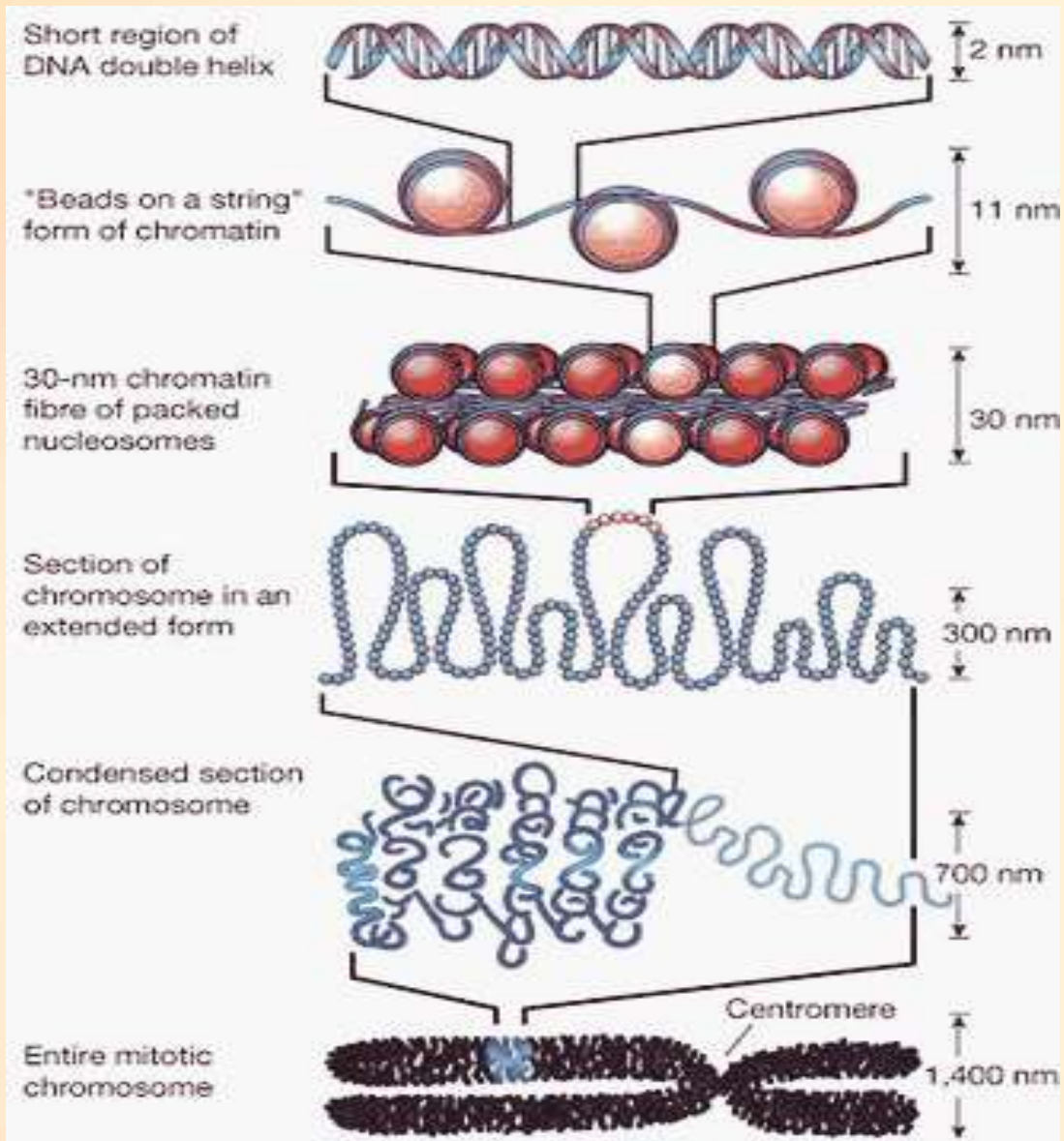
# THE NUCLEOSOME AND DNA PACKING

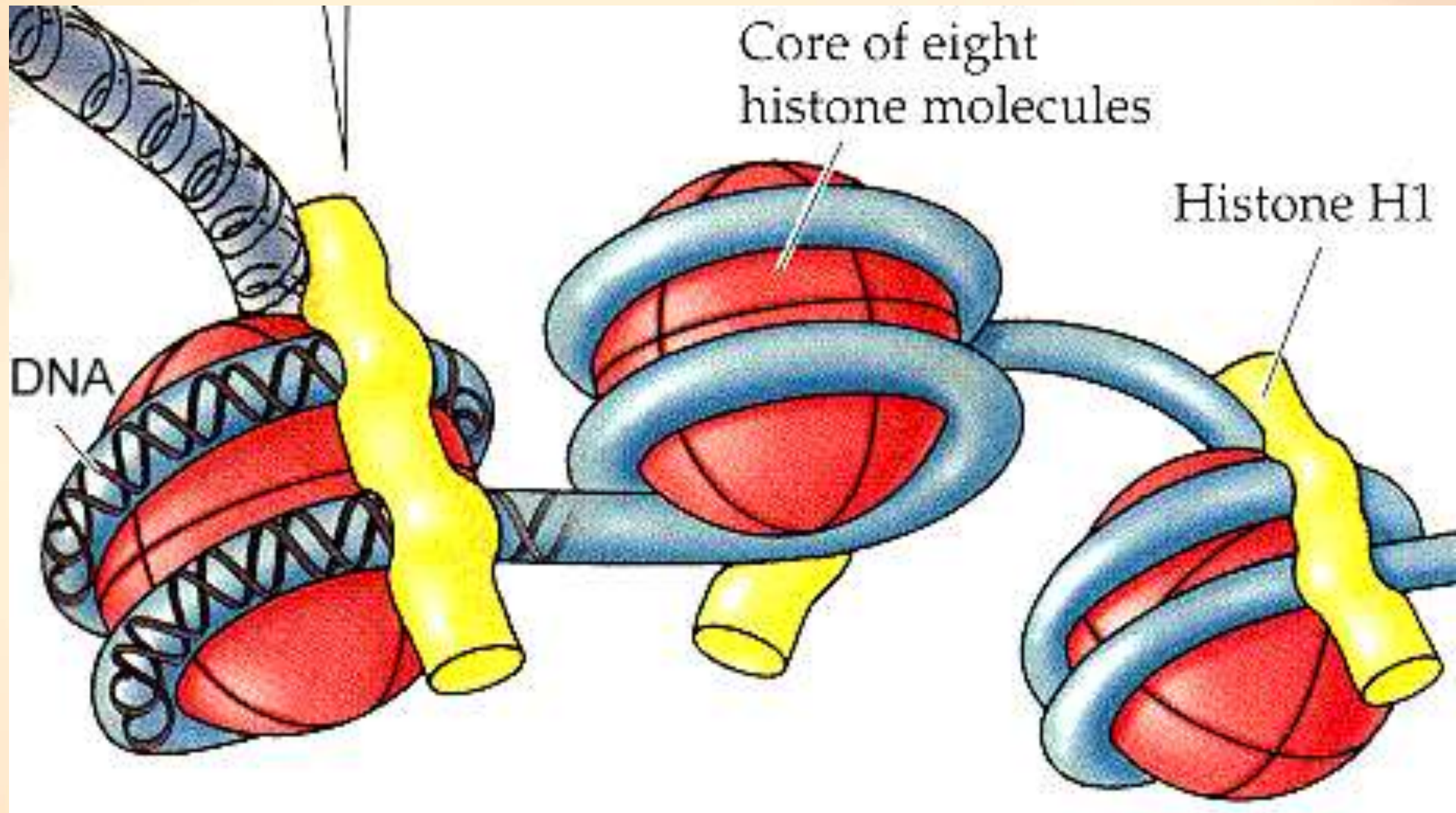
- A nucleosome is a piece of DNA wound around a protein core.
- This DNA - histone association remains intact throughout the cell cycle.
- Histones only leave the DNA very briefly during DNA replication.
- With very few exceptions, histones stay with the DNA during transcription.

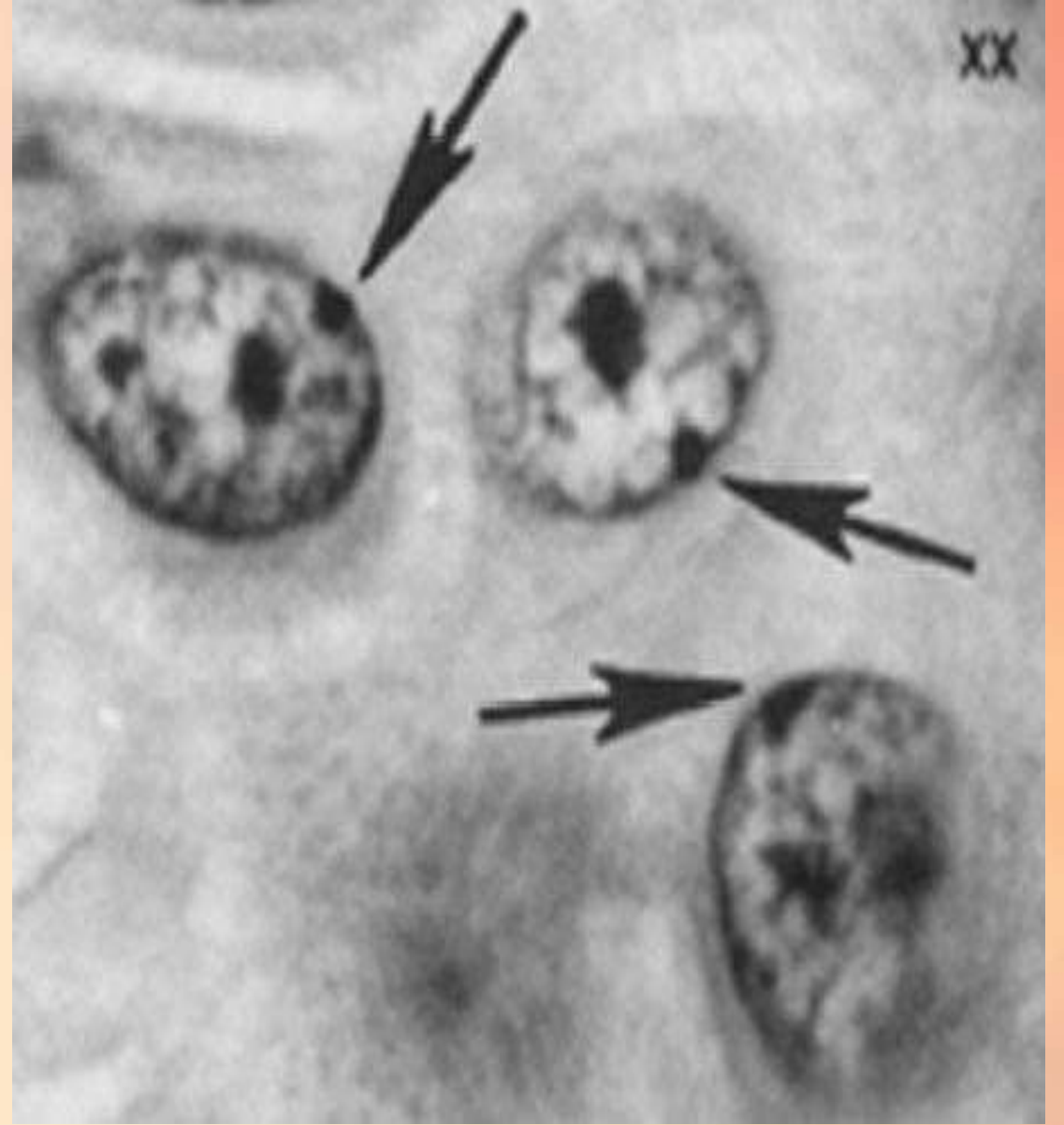
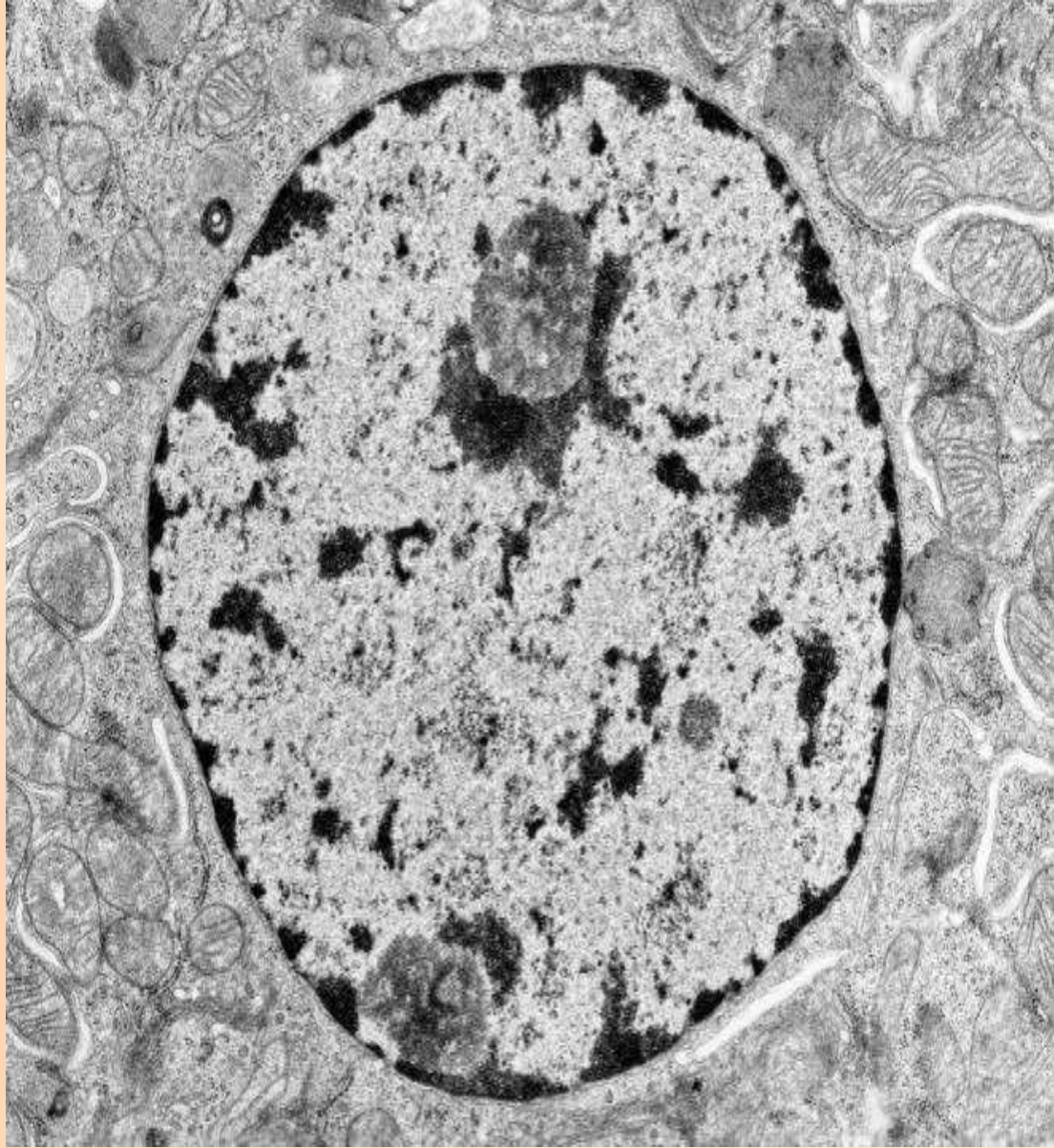
# CHROMATIN STRUCTURES

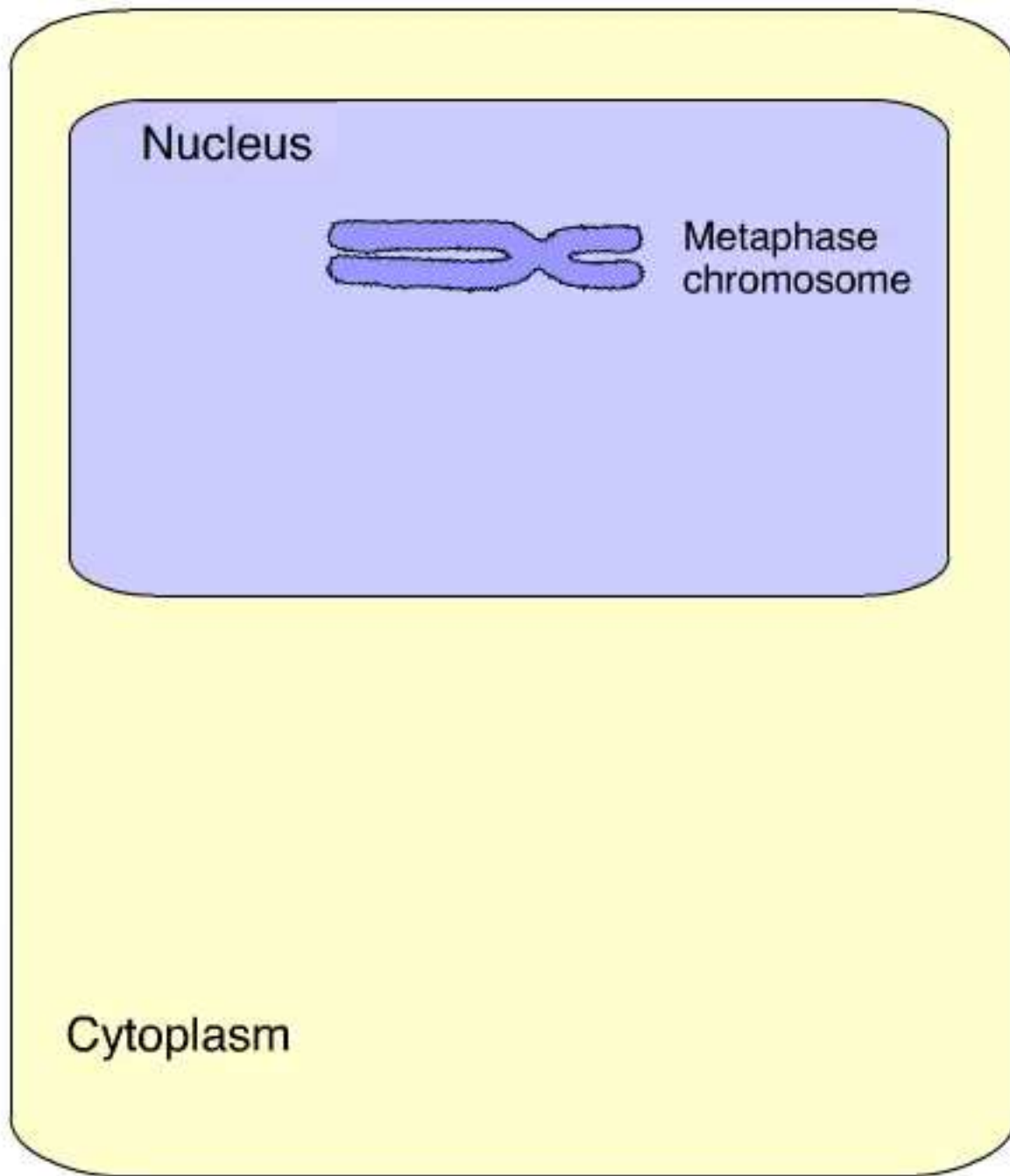













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# GENETIC MAP DISTANCE AND PHYSICAL DISTANCE

- In heterochromatic regions, the genetic map gives a distorted picture of the physical map.
- The physical map is depicted as the chromosome appears in metaphase of mitosis.
- Two genes near the tips and two near the Euchromatin – Heterochromatin junction are indicated in the genetic map
- The map distance across the Euchromatin arms are 54.5 & 49.5 map units.
- The Heterochromatin which constitutes approximately 25% of the entire chromosomes has a genetic length in map units of only 3.0%.
- Very little recombination takes place in heterochromatin a small distance in the genetic map corresponds to a large distance in the chromosome.

# DIFFERENCE BETWEEN EUCHROMATIN AND HETEROCHROMATIN

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

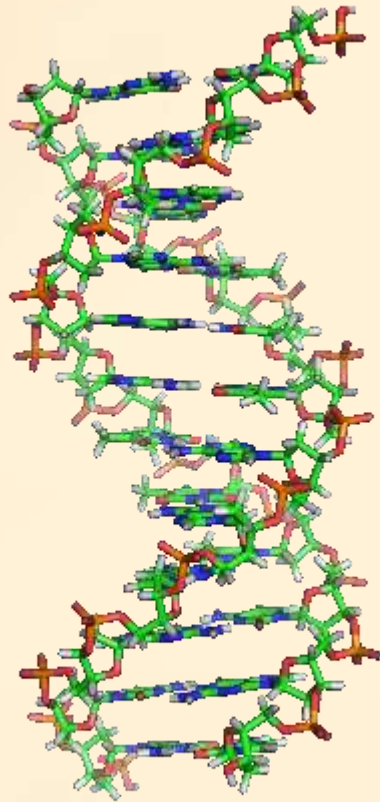
# CONCLUSION

- 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.

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THANK YOU