

# HETEROCHROMATIN AND EUCHROMATIN

**SUSHREE SHIBANEE DASH**

**ASSISTANT PROFESSOR**

**DEPARTMENT OF ZOOLOGY**

**SHAILABALA WOMEN'S AUTONOMOUS COLLEGE, CUTTACK**

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# INTRODUCTION

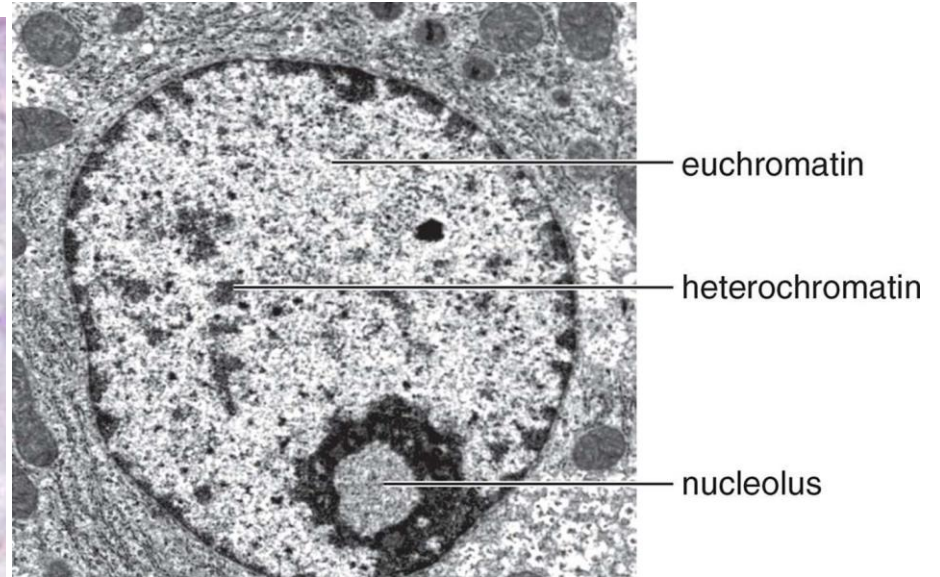
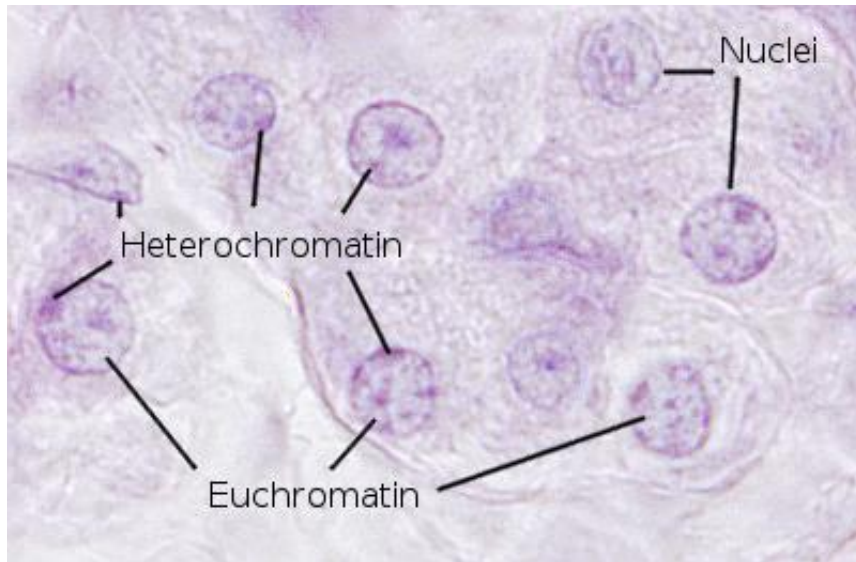
- The term heterochromatin and euchromatin was coined by Emil Heitz in 1928
- Chromatin is composed of DNA and proteins(histones)-help in protein fold so it can be packed into tiny volume of a cell's nucleus.
- These protect DNA inside the nucleus
- 2 types- euchromatin and heterochromatin

# HETEROCHROMATIN

- The region of the chromosome that appear relatively condensed throughout cell cycle, even during interphase and stained deeply with DNA specific stains
- It is tightly packed form of DNA.
- 2 types: Constitutive heterochromatin and facultative heterochromatin
- Play role in gene expression
- Transcriptionally inactive

- Facultative heterochromatin-result of genes silenced through a mechanism such as Histone methylation or siRNA through RNAi.
- Constitutive heterochromatin-usually repetitive and forms structural areas like centromeres and telomeres.
  - rich in satellite DNA
  - surrounds the centromere and telomere

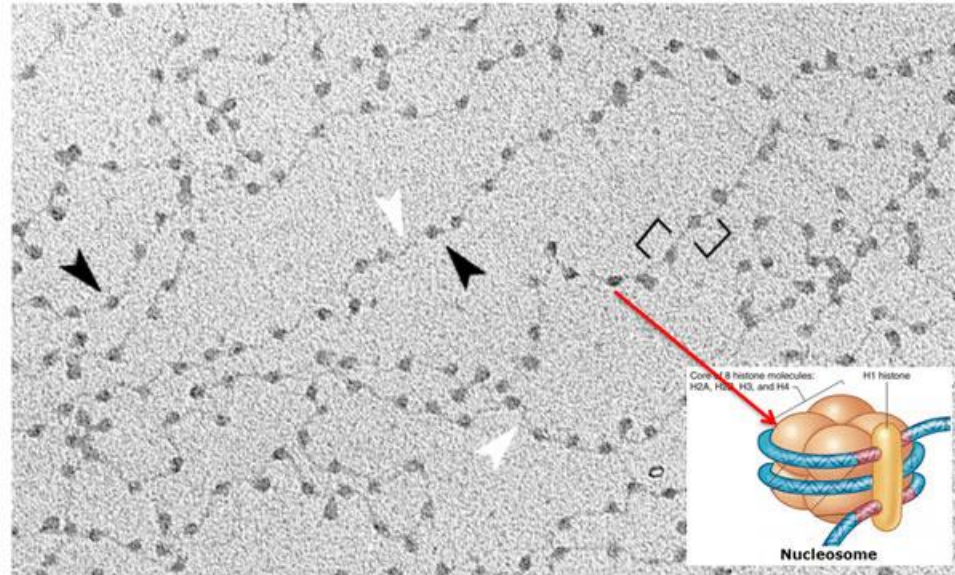
# HOW DO THEY APPEAR?



# EUCHROMATIN

- Lightly packed form/loosely coiled
- Rich in gene concentration
- Under Active transcription
- Comprises most active portion of human genome inside the nucleus, 92% of human genome is euchromatin.
- An elongated, open 10nm fibre(electron microscopy)

# DNA PACKAGING



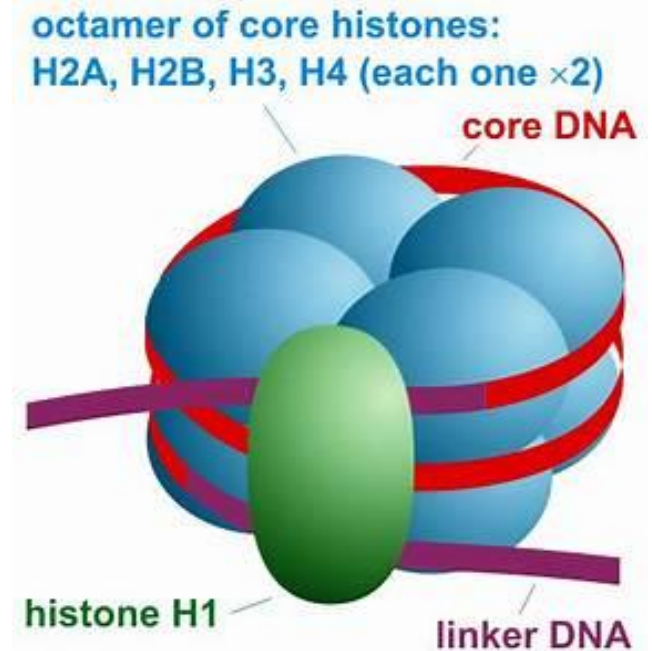
**Beads-on-string:** the beads (black arrow head) represents histone core, white arrow head represents linker DNA. Black square bracket represent individual nucleosome. Enlarged image: nucleosome. *Image source: cc wikipedia*

- Unfolded chromatins-beads on a string
- Beads-nucleosomes(basic unit of DNA packaging)
- String-DNA

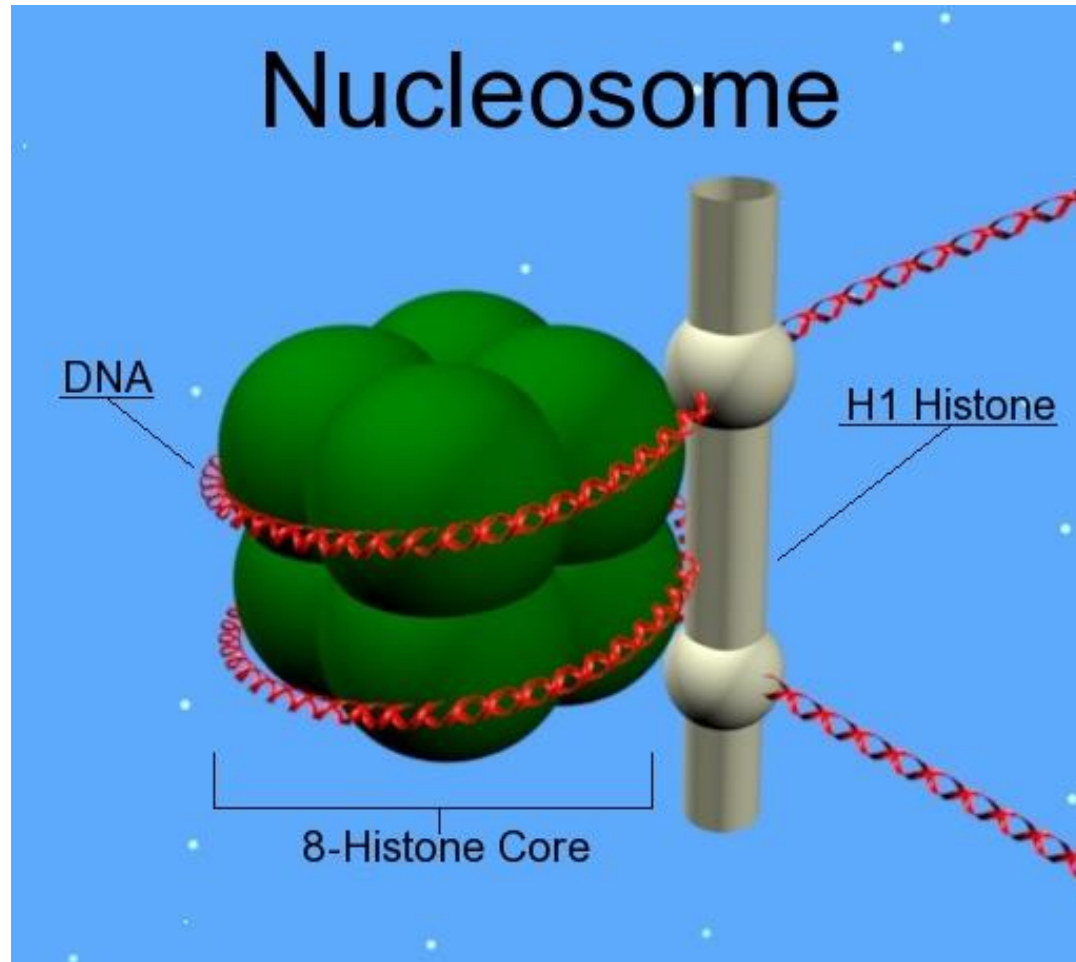


# Nucleosome

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



# NUCLEOSOME



# PACKAGING HIERARCHY

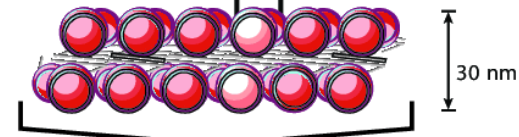
Short region of DNA double helix



"Beads on a string" form of chromatin



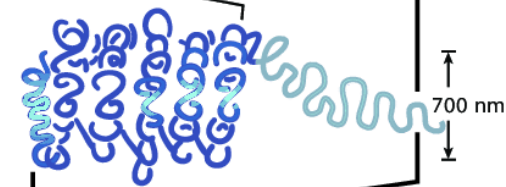
30-nm chromatin fibre of packed nucleosomes



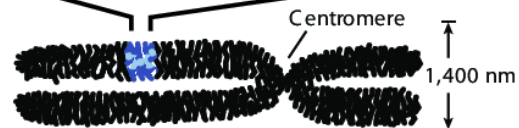
Section of chromosome in an extended form



Condensed section of chromosome



Entire mitotic chromosome



# Histones

- 5 kinds-H1, H2A, H2B, H3, H4
- Extremely abundant proteins
- Mass of histones in eukaryotic nuclei=mass of DNA

# DIFFERENCE

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