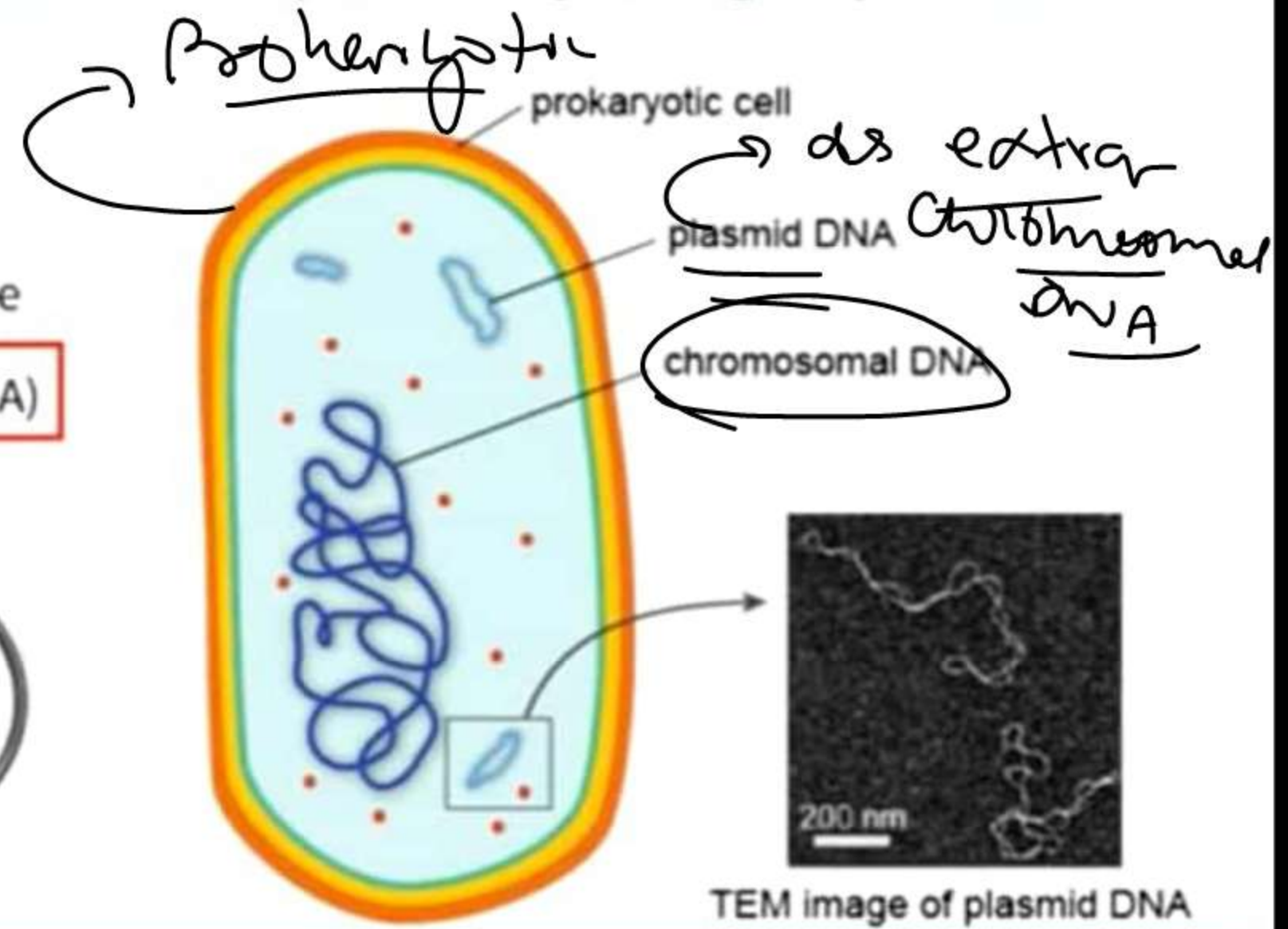
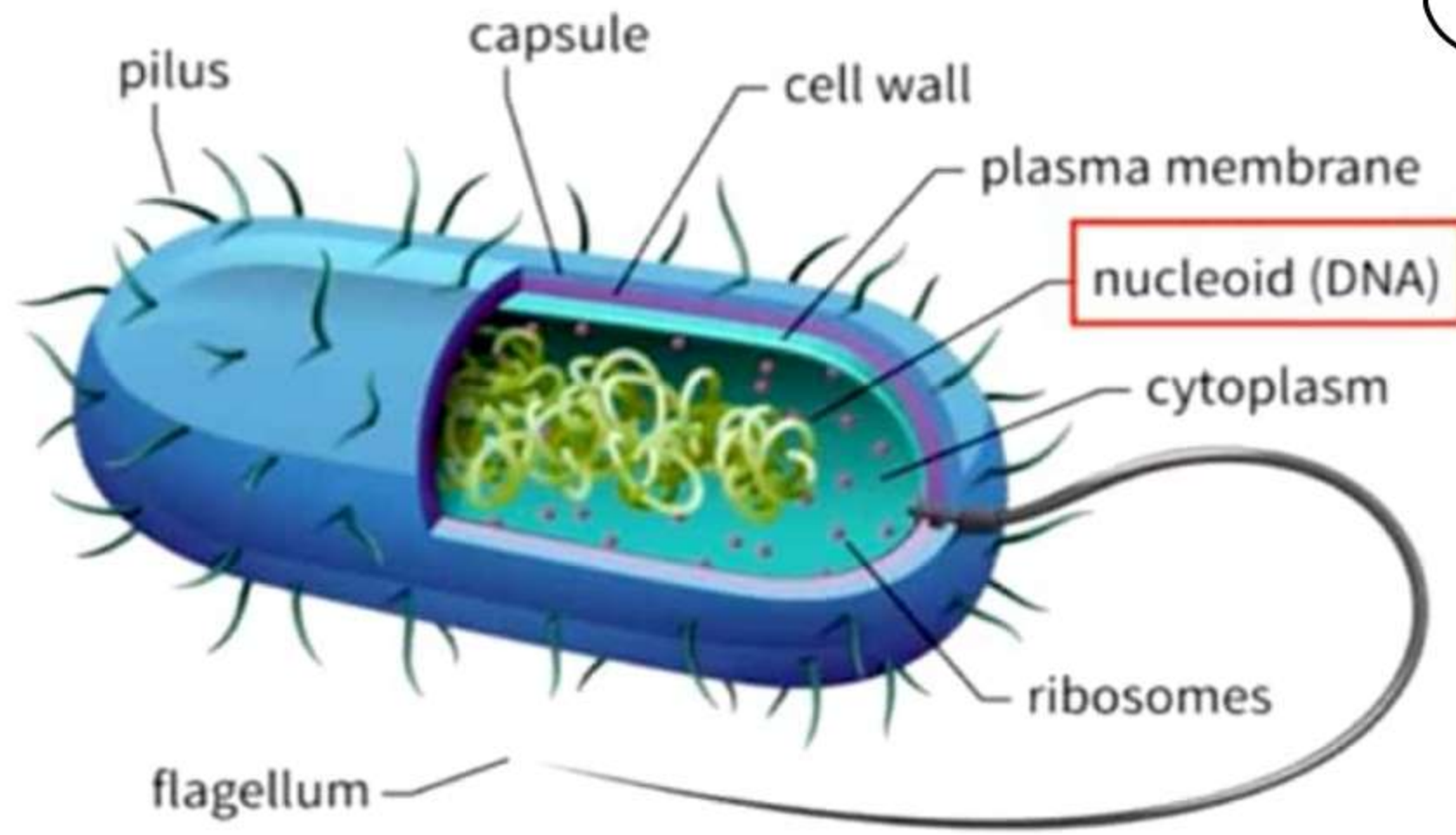


PACKAGING OF DNA HELIX

IN PROKARYOTES

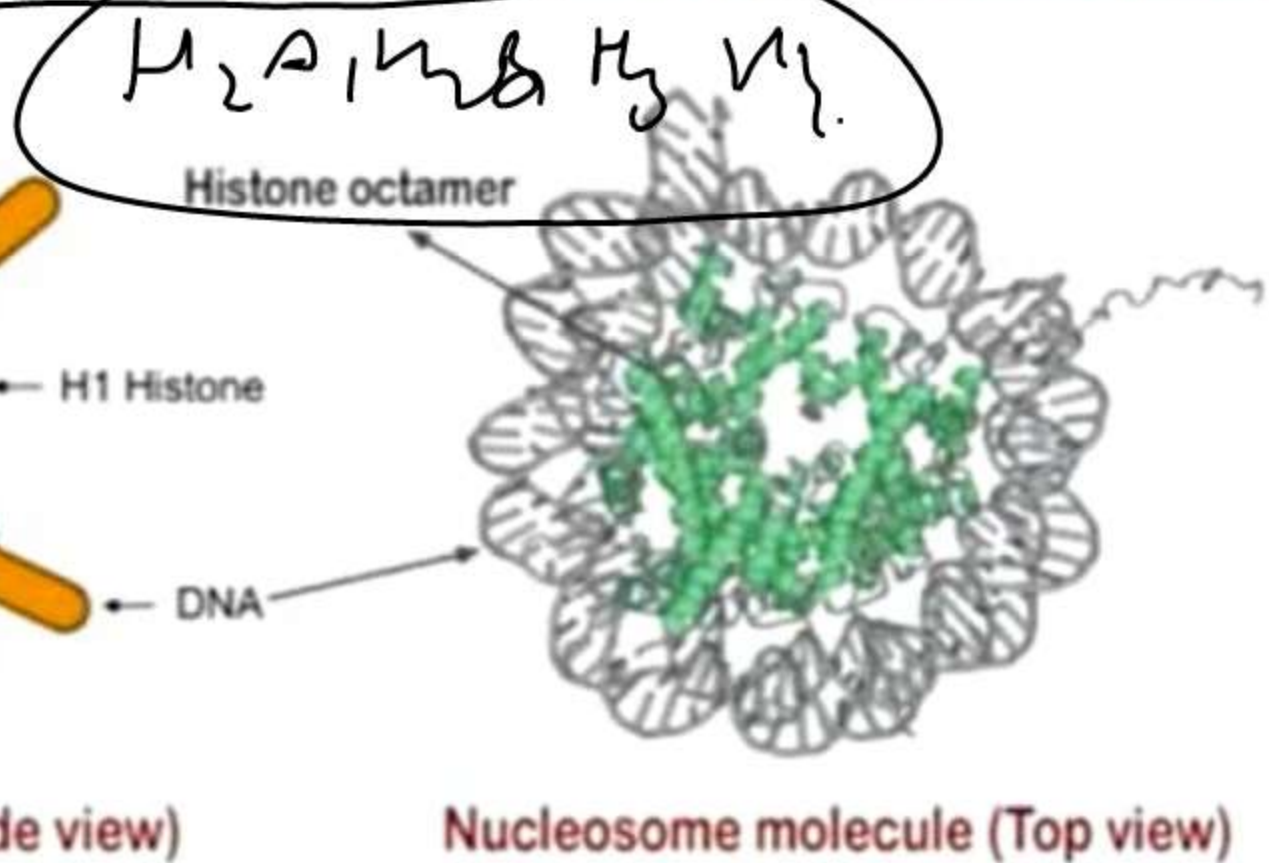
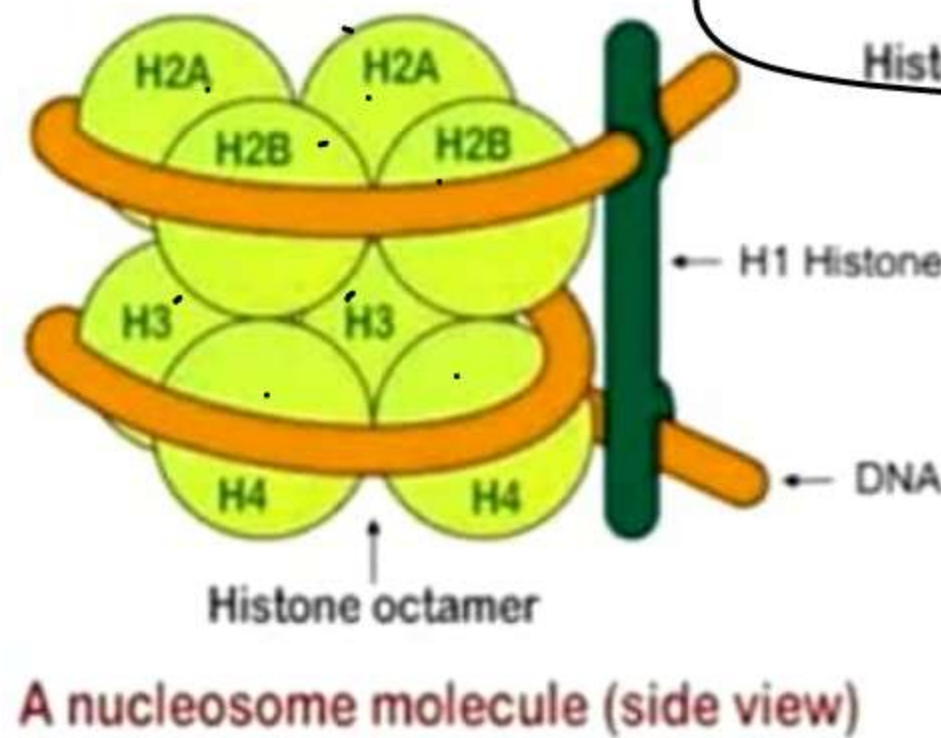
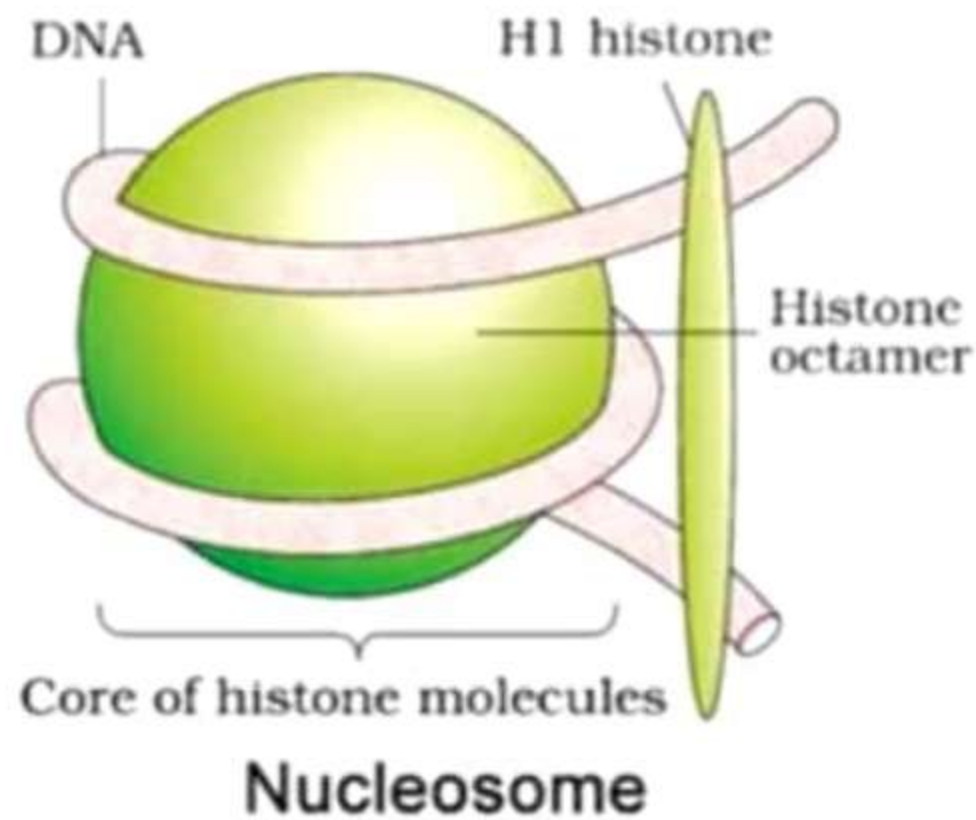
- In prokaryotes (E.g. *E. coli*), the DNA is not scattered throughout the cell.
- DNA is **negatively charged**. So it is held with some positively charged proteins to form **nucleoid**.



PACKAGING OF DNA HELIX

IN EUKARYOTES

- In eukaryotes, there is a set of positively charged, basic proteins called **histones**.
- Histones are rich in positively charged basic amino acid residues **lysines & arginines**.
- 8 histones form **histone octamer**.
- Negatively charged DNA is wrapped around histone octamer to give **nucleosome**.

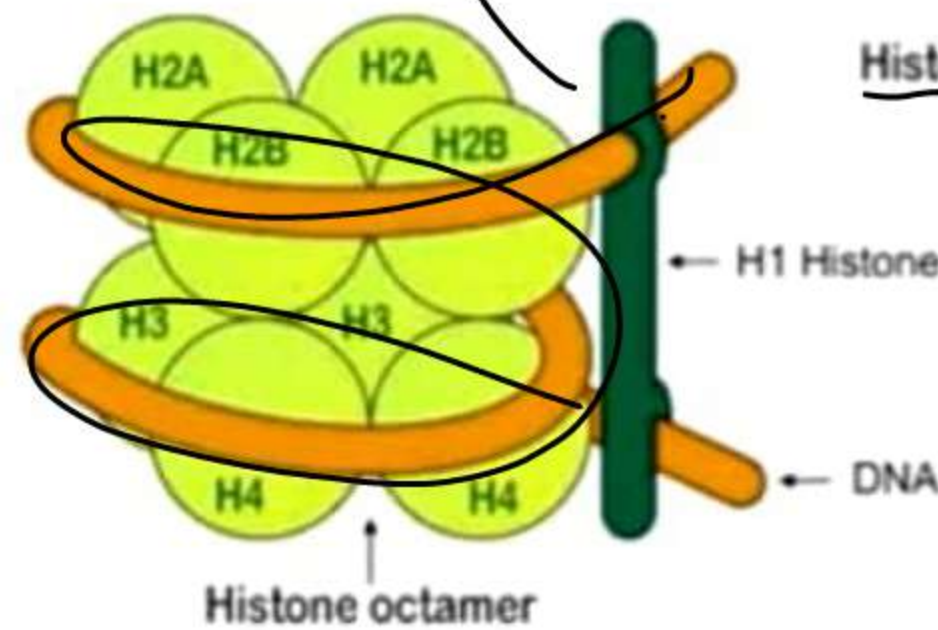
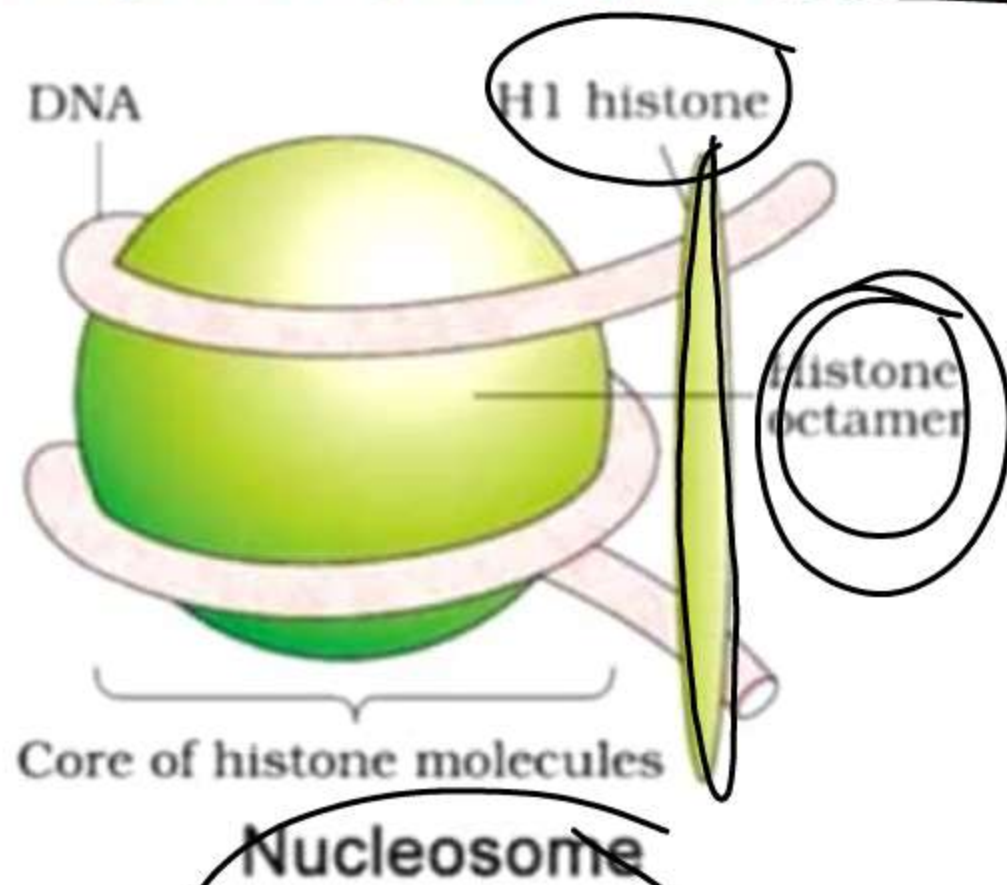


PACKAGING OF DNA HELIX

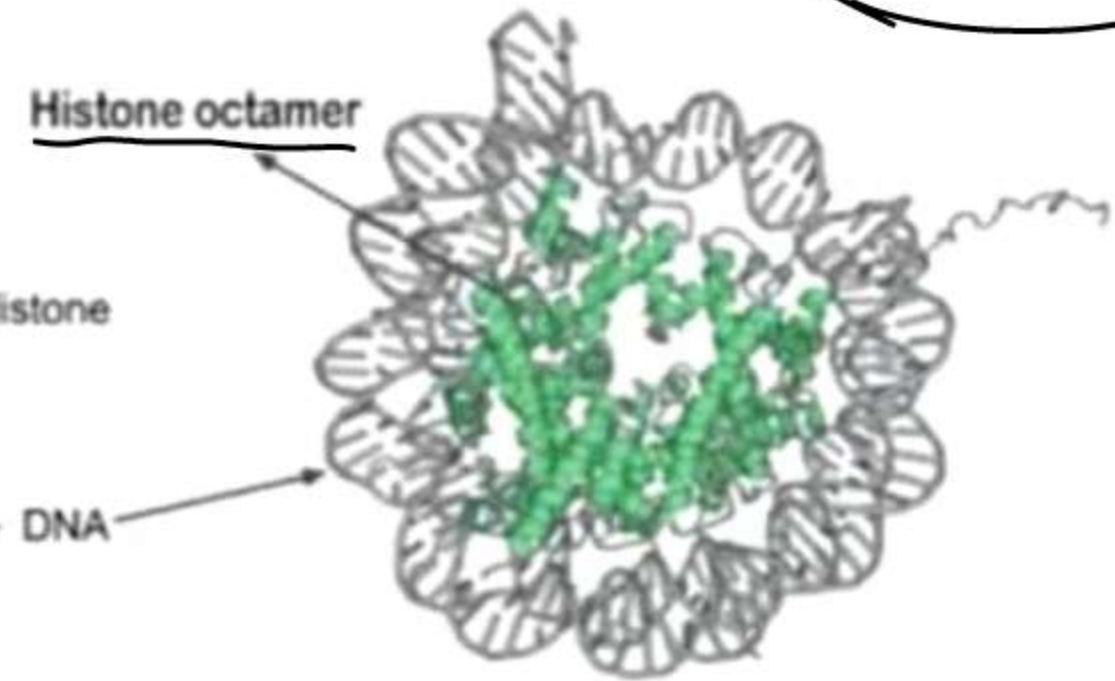
IN EUKARYOTES

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turn = 1 3/4 turn = 1.75 turn



A nucleosome molecule (side view)



Nucleosome molecule (Top view)

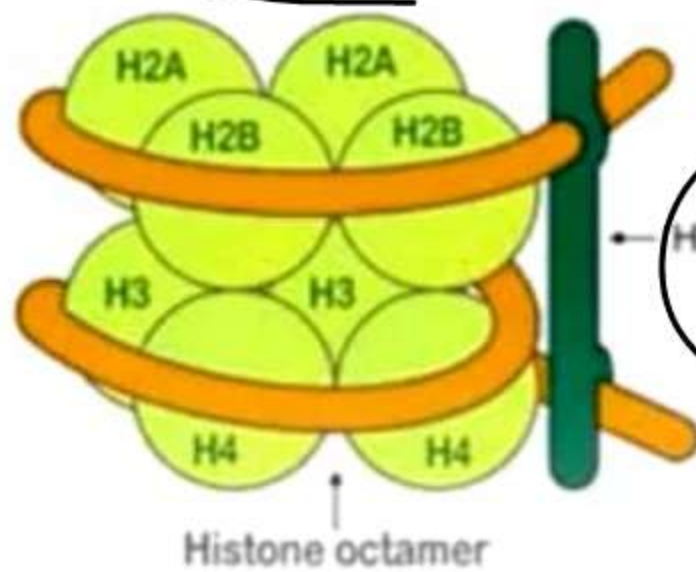
PACKAGING OF DNA HELIX

IN EUKARYOTES

- A typical nucleosome contains **200 bp.**
- Therefore, total number of nucleosomes in human =

$$\frac{6.6 \times 10^9 \text{ bp}}{200} = 3.3 \times 10^7$$

(Nucleosome)

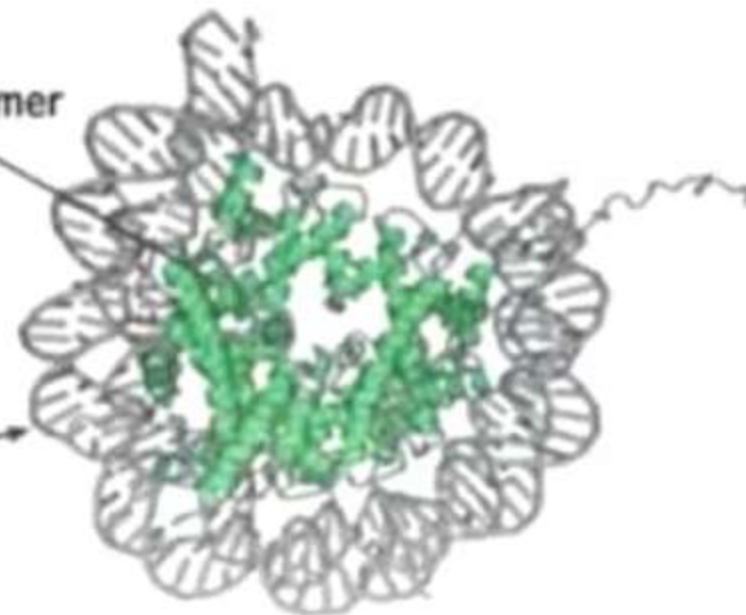


A nucleosome molecule (side view)

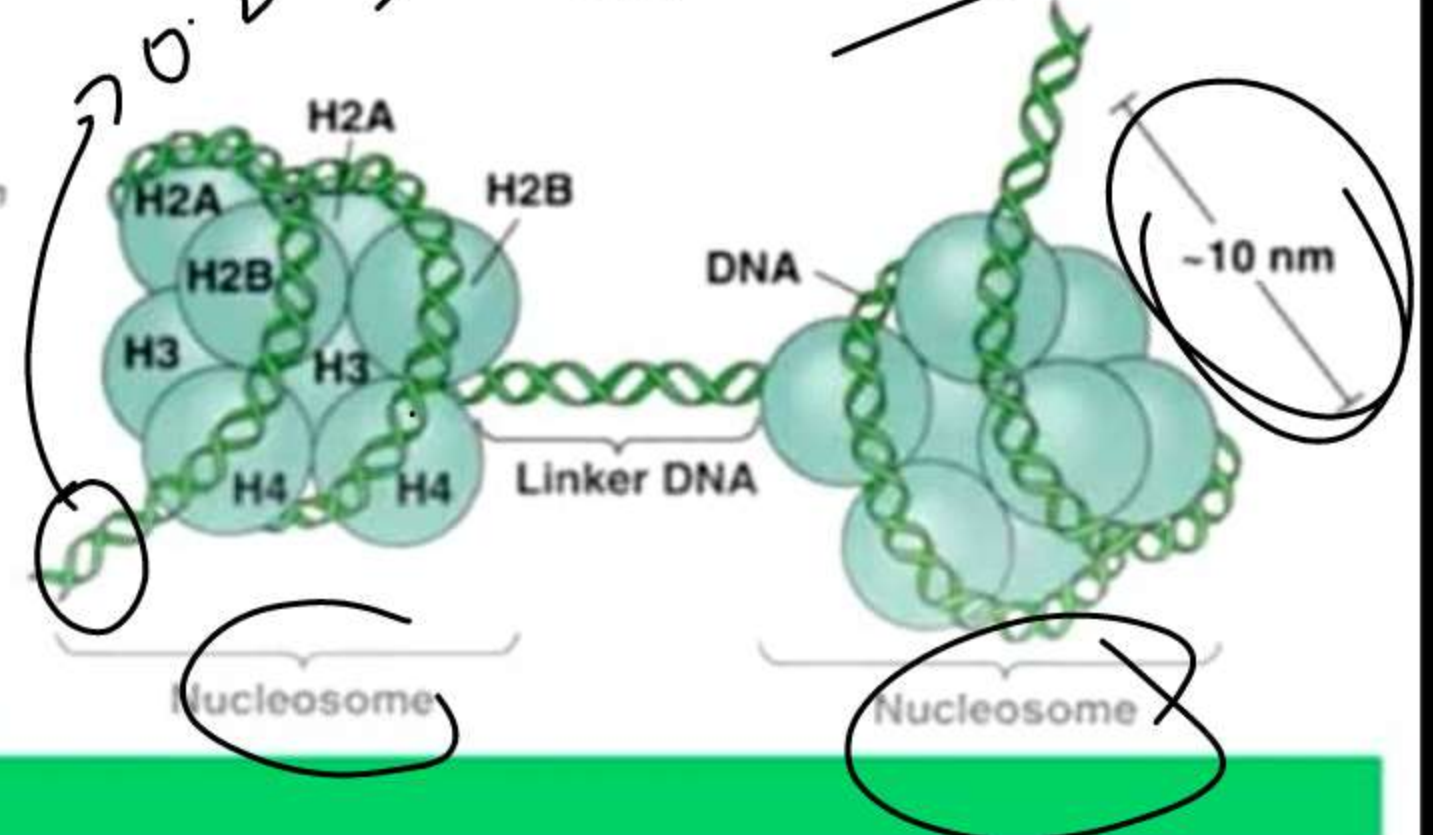
Histone octamer



DNA



Nucleosome molecule (Top view)



PACKAGING OF DNA HELIX

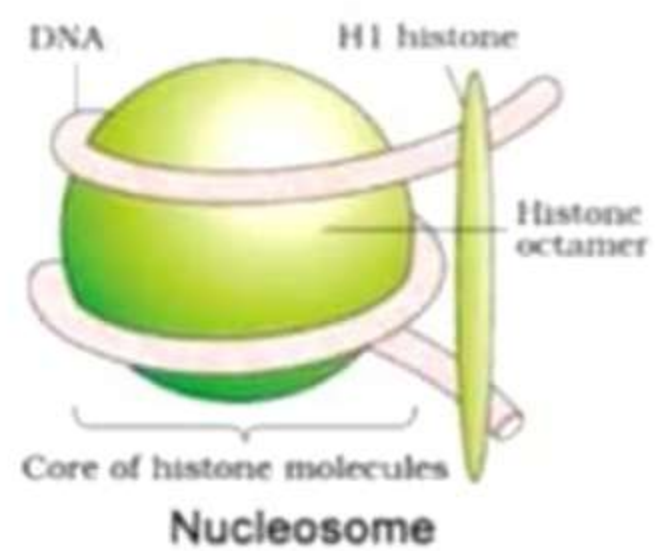
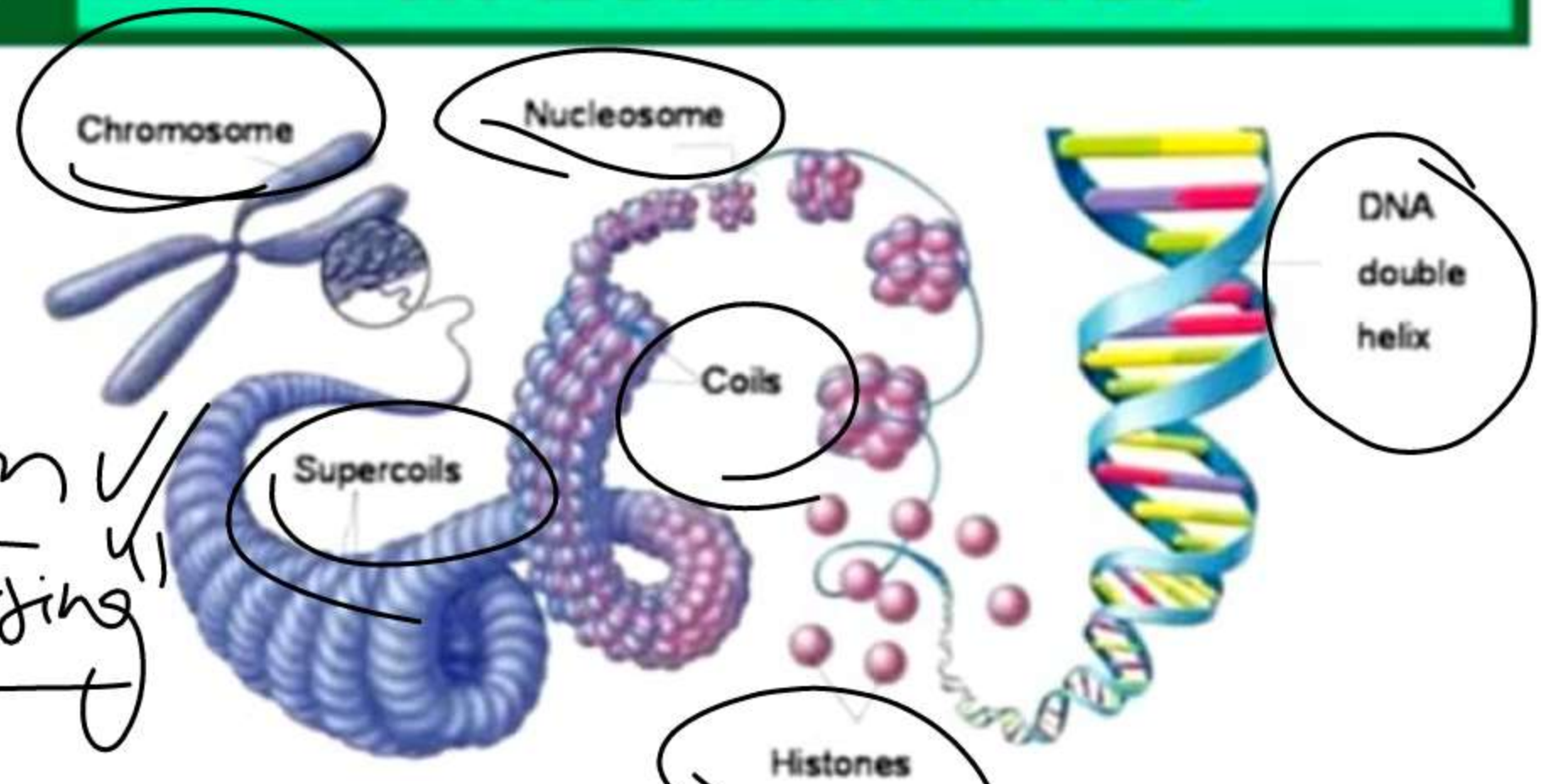
IN EUKARYOTES

NEET-2023

- Nucleosomes constitute the repeating unit to form chromatin
- Chromatin is the thread-like stained bodies.
- Nucleosomes in chromatin = 'beads-on-string'.

|| Beads on string ||

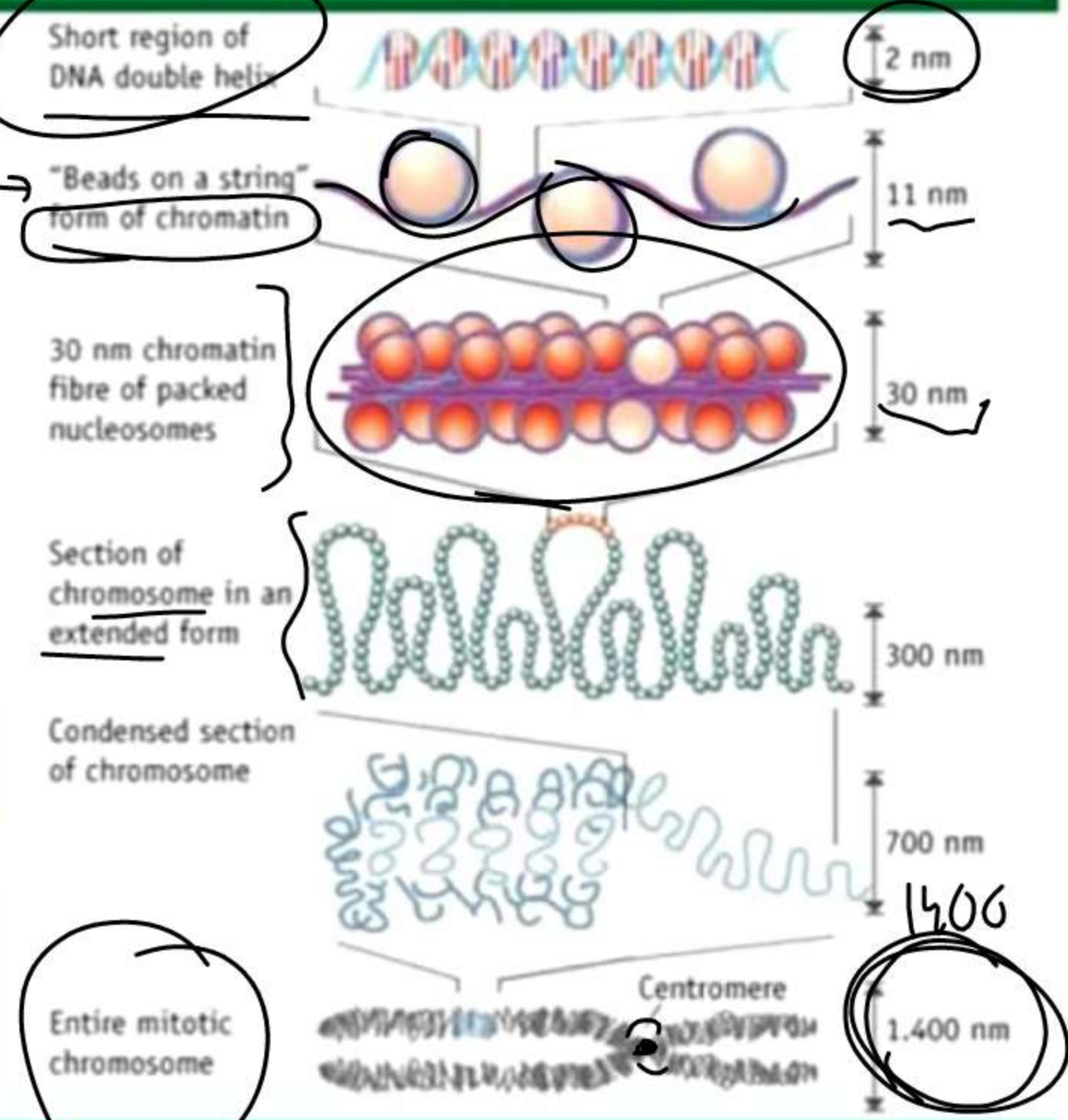
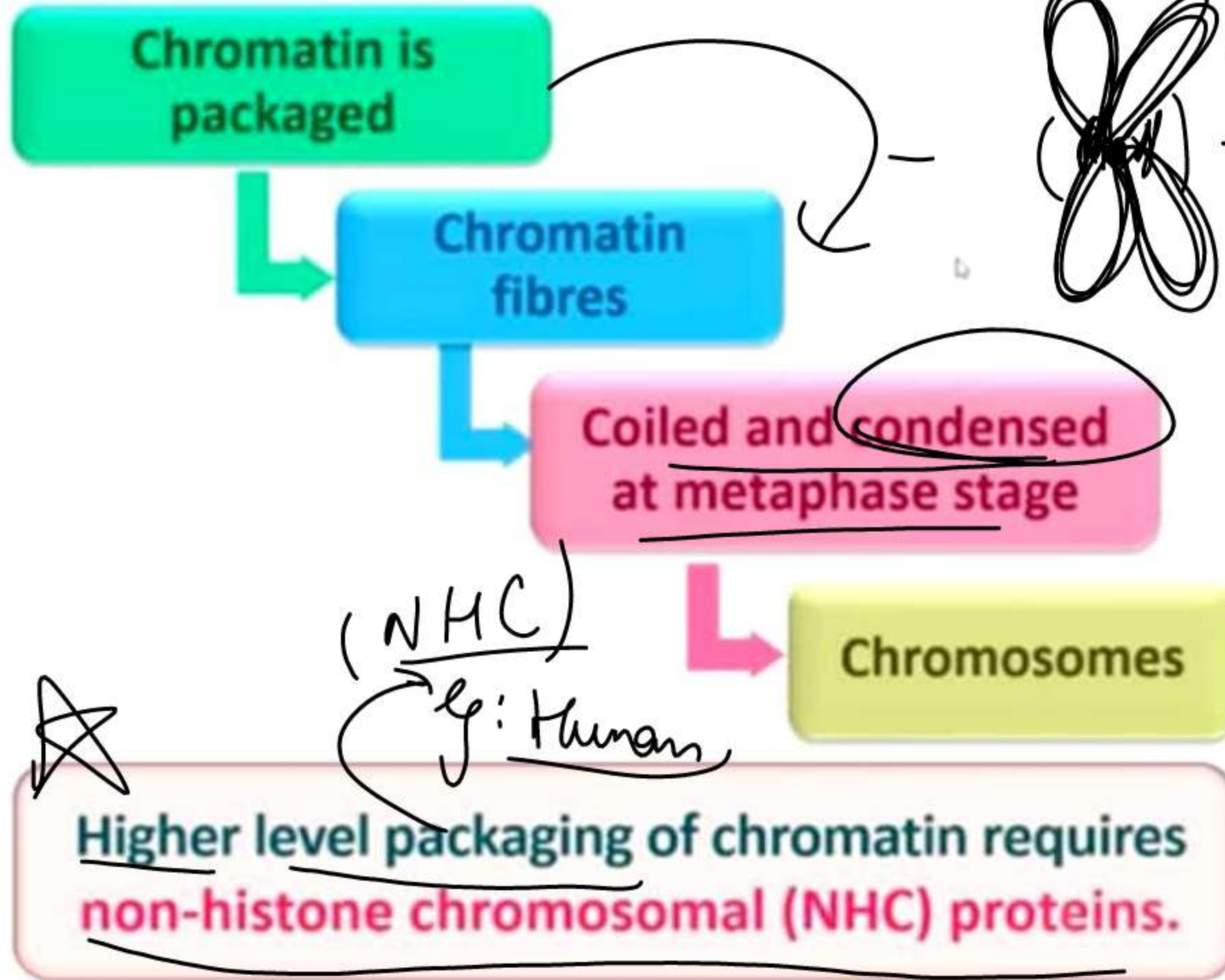
|| Nucleosomes ||



Beads-on-string form of chromatin

PACKAGING OF DNA HELIX

IN EUKARYOTES



PACKAGING OF DNA HELIX

IN EUKARYOTES

Chromatin has 2 forms

True chromatin

transcriptionally

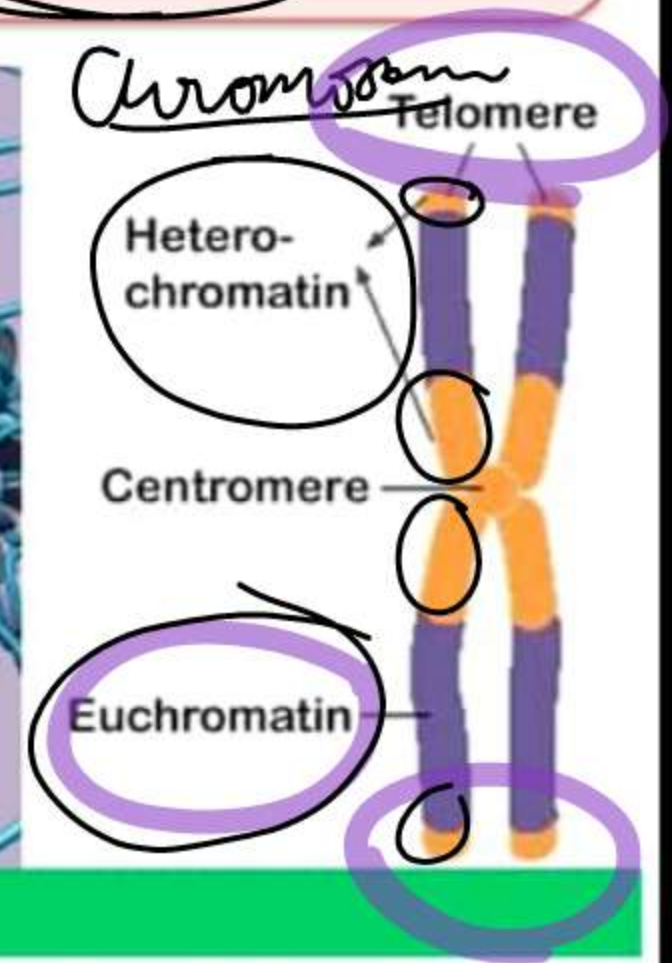
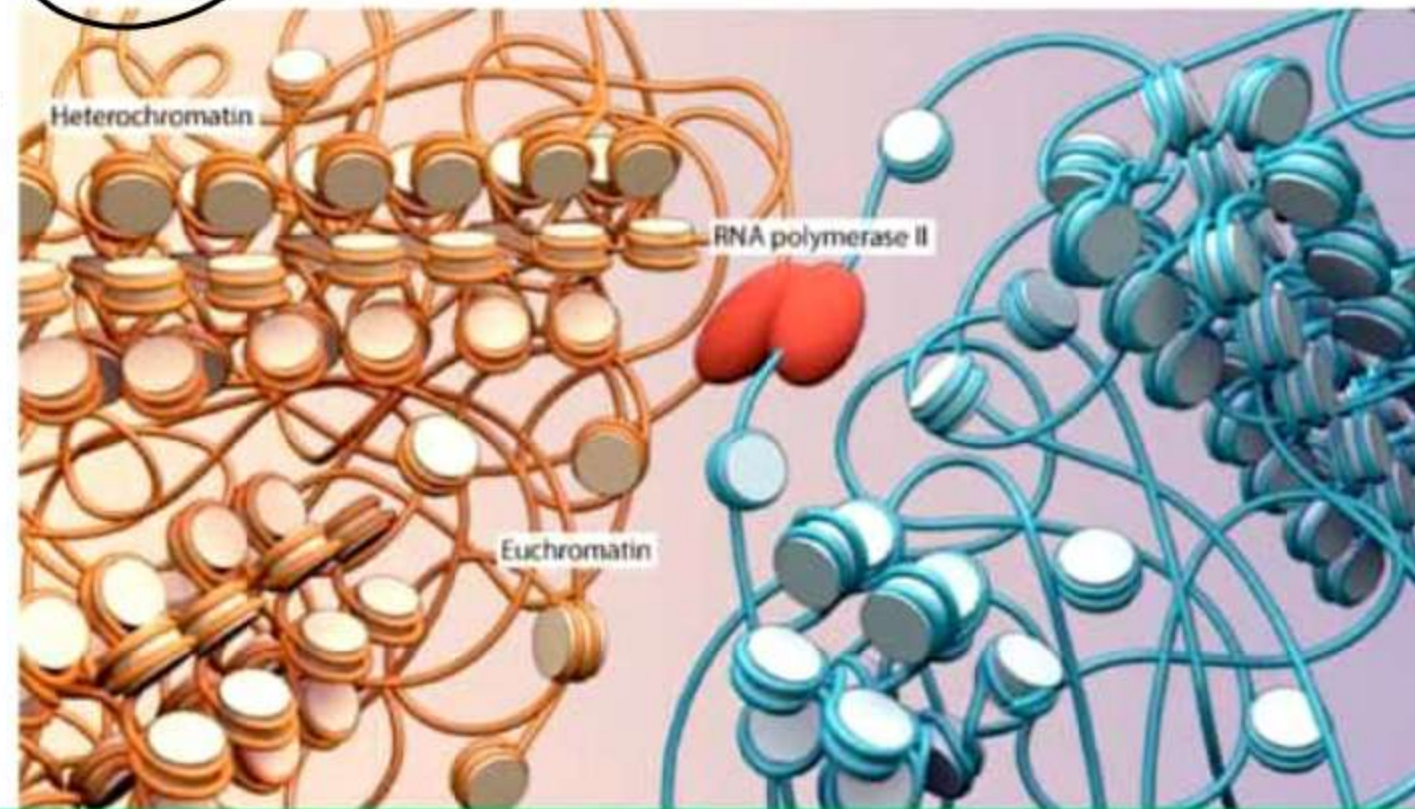
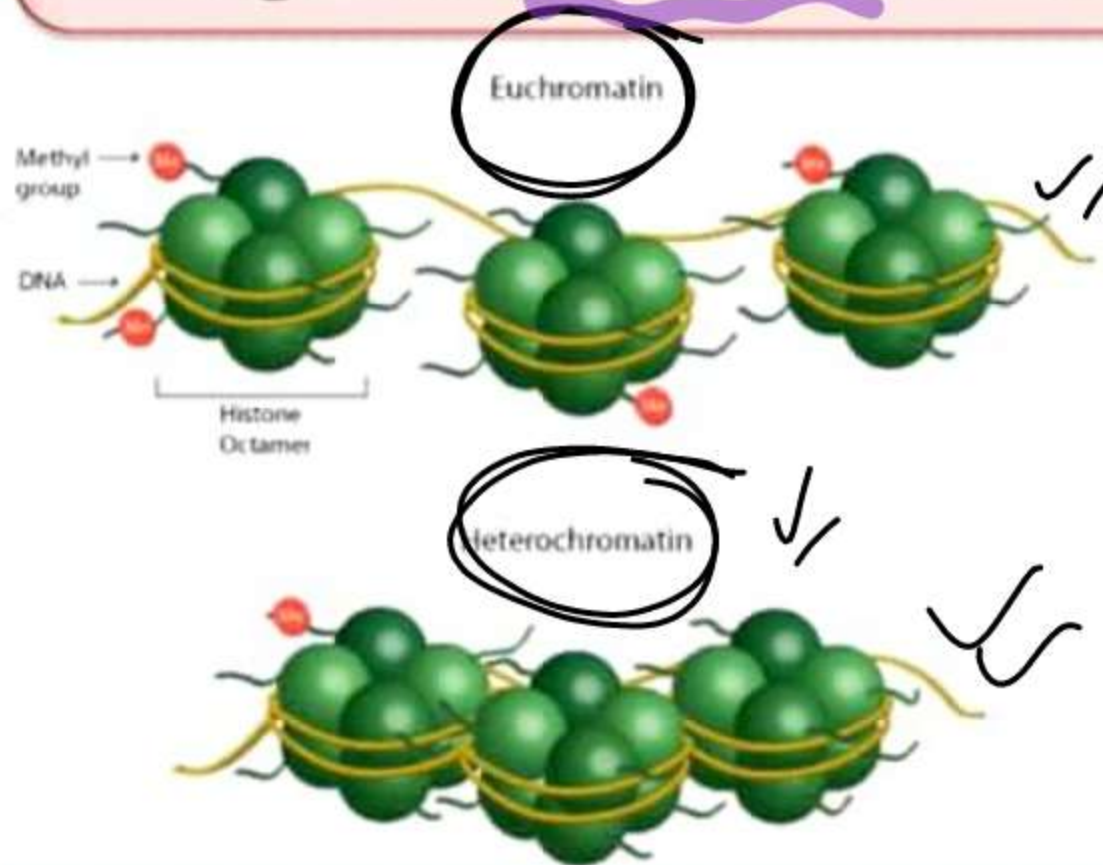
Euchromatin

DNA → RNA

Heterochromatin

Loosely packed, transcriptionally active region of chromatin. It stains light.

Densely packed, inactive region of chromatin. It stains dark.



The term 'Nuclein' for the genetic material [NEET-2020]
was used by :

- (A) Franklin
- (B) Meischer
- (C) Chargaff
- (D) Mendel

(1869)

*

Conrad

Wolff
genetics

Purines found both in DNA and RNA [NEET-2019]
are:

- (A) Cytosine and thymine
- (B) Adenine and thymine
- (C) Adenine and guanine
- (D) Guanine and cytosine

Complete the flow chart on central dogma [NEET-2021]



- (1) (a) – Replication; (b) – Transcription;
(c) – Translation; (d) – Protein
- (2) (a) – Transduction; (b) – Translation;
(c) – Replication; (d) – Protein
- (3) (a) – Replication; (b) – Transcription
(c) – Transduction; (d) – Protein
- (4) (a) – Transcription; (b) – Replication
(c) – Transcription; (d) – Transduction

Bacteriophage (Mode of DNA transfer)
Transduction

If Adenine makes 30% of the DNA molecule, [NEET-2021]
what will be the percentage of Thymine,
Guanine and Cytosine in it?

100%

(A) T:30; G:20; C:20

(B) T:20; G:25; C:25

(C) T:20; G:30; C:20

(D) T:20; G:20; C:30

60%
40%

$A = 20\%$
Purine = Pyrimidine
 $A = T$ (20%, 20%)

Ques Calculate the force acting between two charges, $q_1 = 4C$ & $q_2 = 3C$ kept at 5m distance between them:

Ans.



$$F = \frac{K q_1 q_2}{r^2}$$

$$\begin{aligned}
 F &= \frac{9 \times 10^9 \times 4 \times 3}{5 \times 5} \\
 &= 9 \times 10^7 \times \frac{12}{25} \\
 &= 432 \times 10^7 \text{ N} \\
 &= 4.32 \times 10^9 \text{ N}
 \end{aligned}$$

Amino Acid

Acidic

- ~~Glutamic~~
- Aspartic acid
- Cysteic acid

Basic

- Histidine
- Lysine
- Arginine

Neutral

- Valine, Isoleucine,
- Leucine, Phenylalanine
- Trp

Valine, ←

Isoleucine

Leucine

Tryptophan

Phenylalanine

→ Histones are only present in
~~prokaryotes~~ Eukaryotes not prokaryotes
because prok. are simpler and
don't have true chromosomes
are primitive in nature.

Q → Human Cell (2n)

Nucleosome?

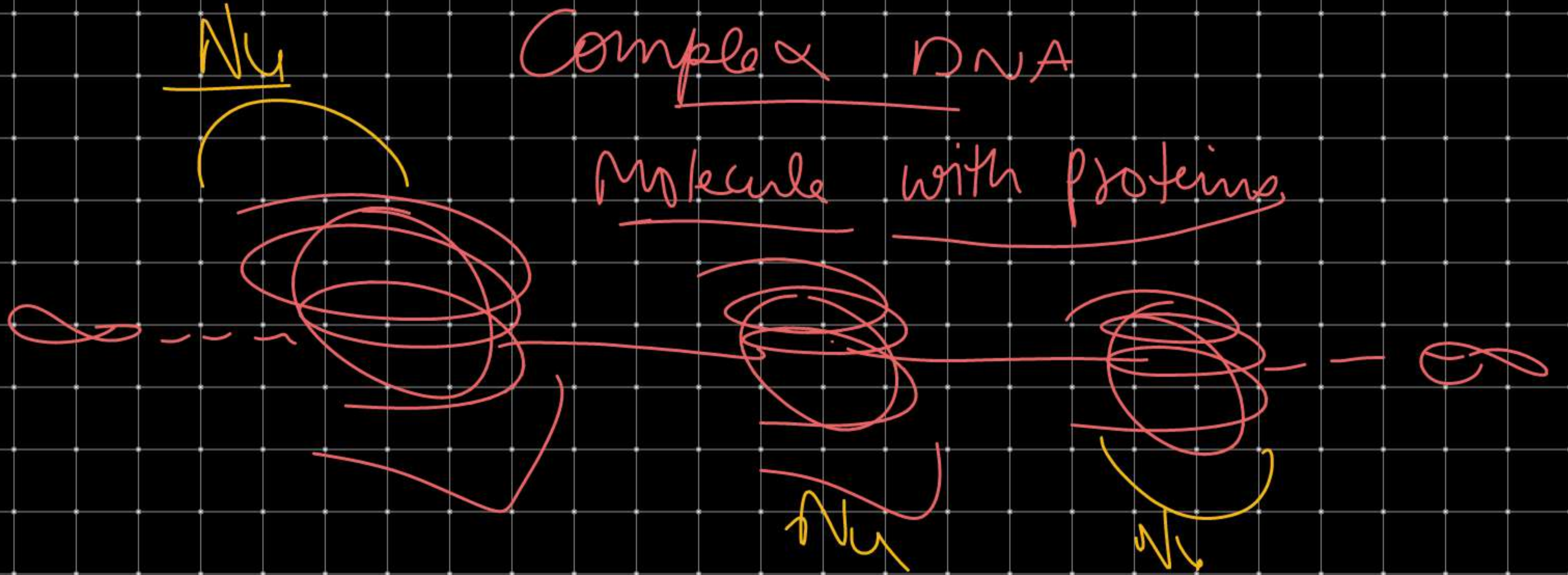
↳ $2n \Rightarrow \frac{3.3 \times 10^9 \times 2}{\cancel{200} \cancel{100}} = \text{Total BP}$

Total $\Rightarrow 3.3 \times 10^7$ Nucleosome

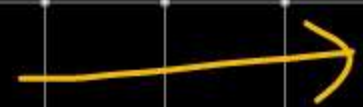
→ Nucleosomes are the repeating
unit of chromatin (DNA + protein)

↓
Complex DNA

Molecule with proteins

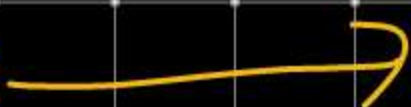


DNA Helix
(2nm)



Nucleosome

(200bp) ~~★~~



Solenoid



(1400nm)

Chromatin

