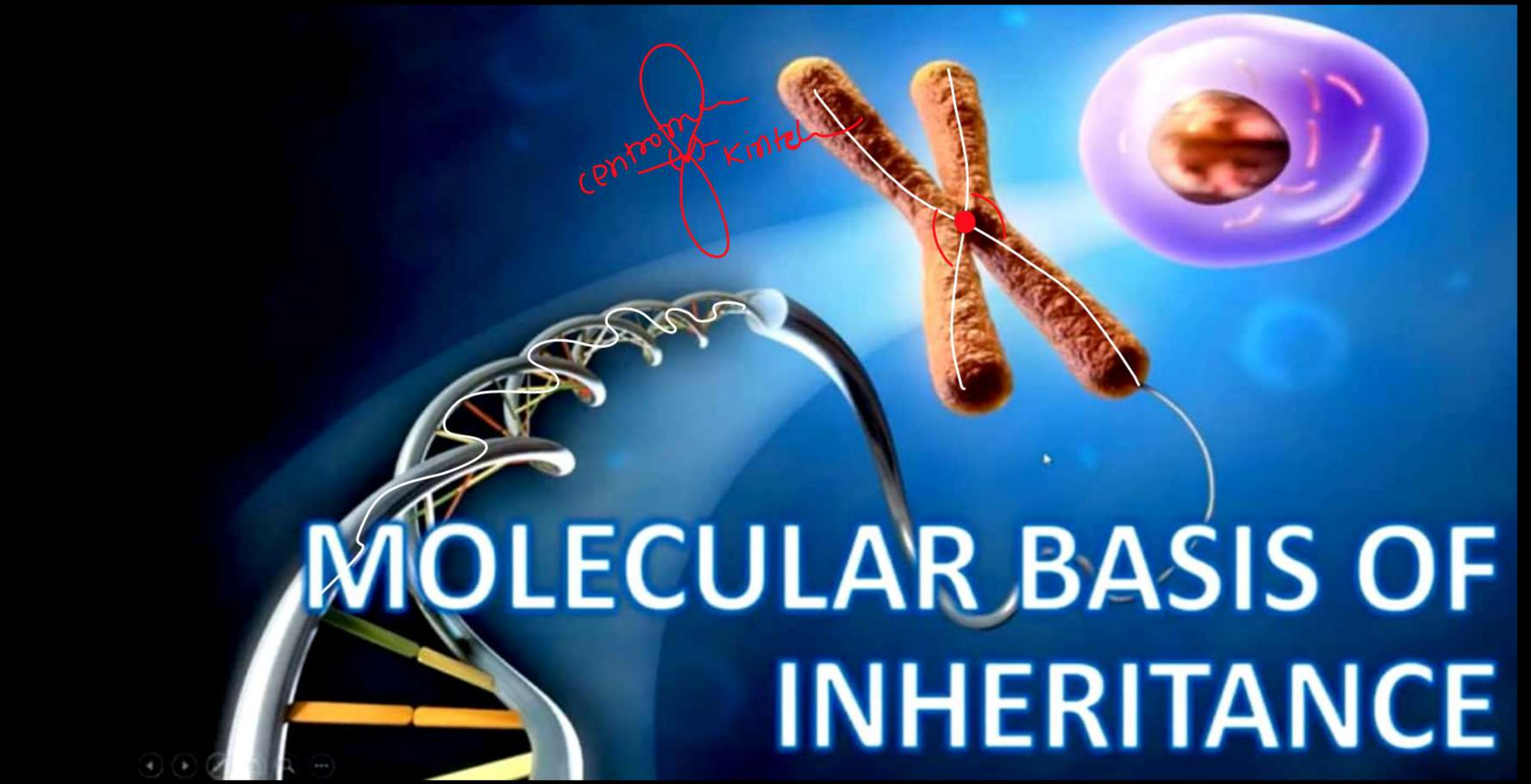
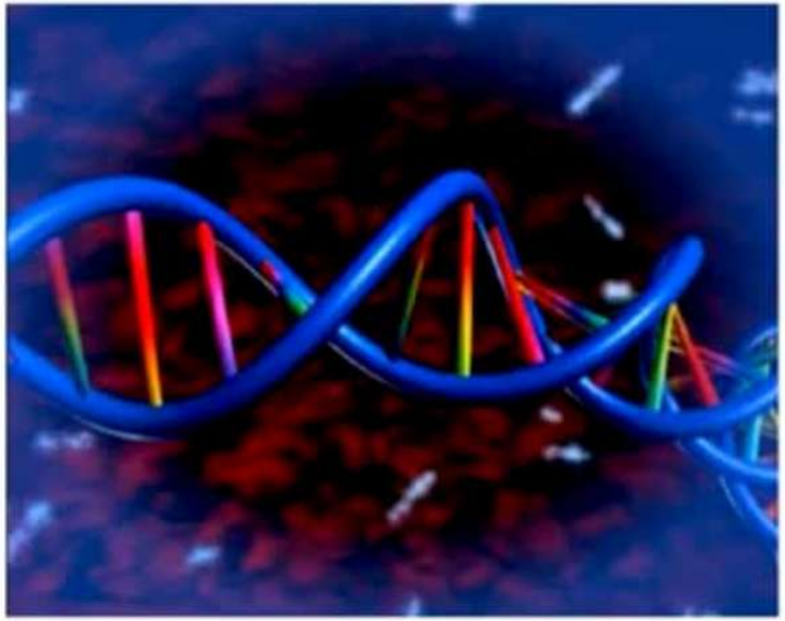
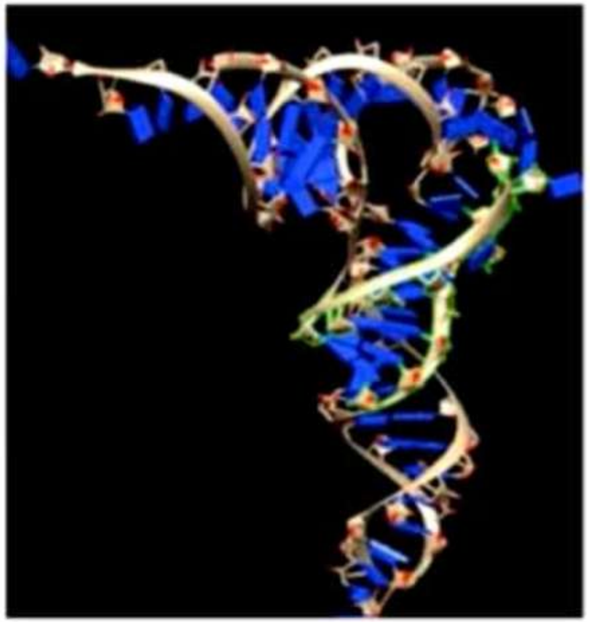

MOLECULAR BASIS OF
INHERITANCE





- **Nucleic acids (DNA and RNA)** are the building blocks of genetic material.
- **DNA** is the **genetic material** in most of the organisms.
- **RNA** is the genetic material in some **viruses.**
- **RNA** mostly functions as **messengers.**

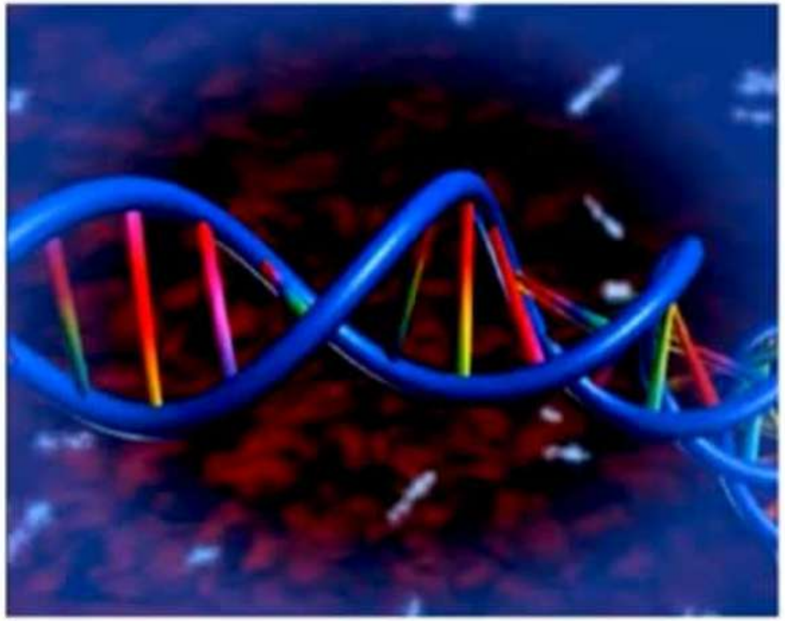
Prokaryotes

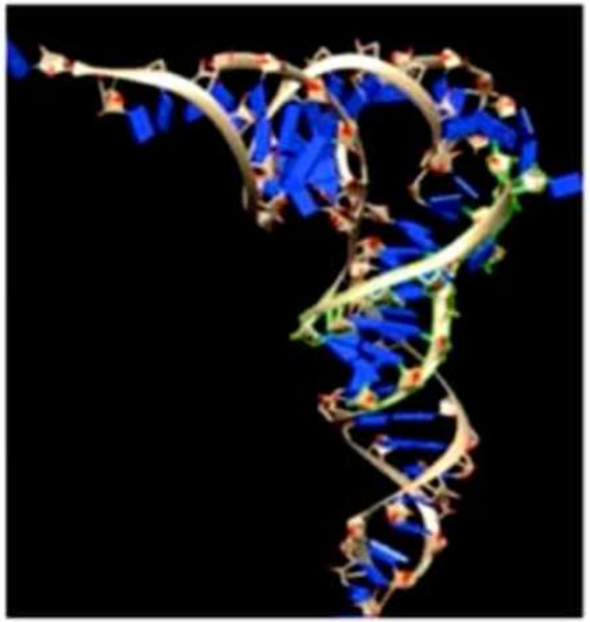
Eukaryotes

ds-DNA

ss DNA

ds DNA ⇒

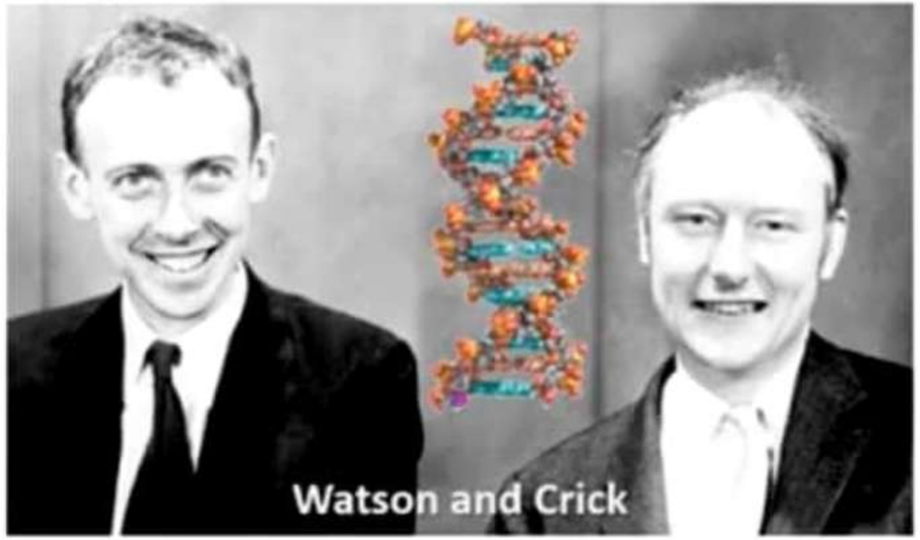




- **Nucleic acids (DNA and RNA) are the building blocks of genetic material.**
- **DNA is the genetic material in most of the organisms.**
- **RNA is the genetic material in some viruses.** COVID-19 SS RNA
- **RNA mostly functions as messengers.** m-RNA

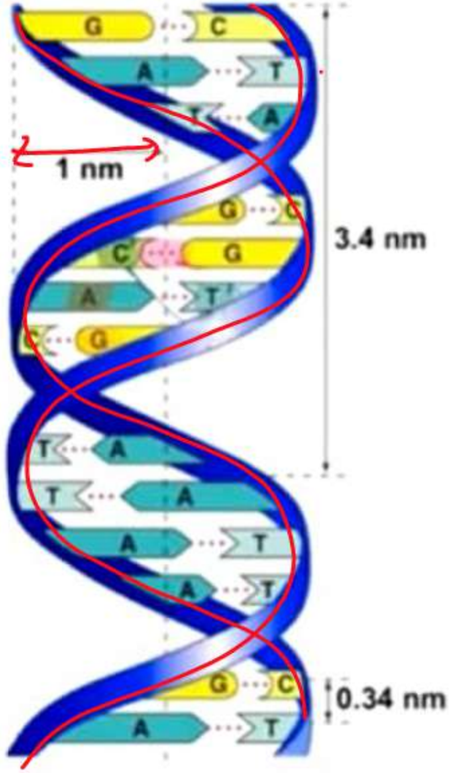
THE DNA

- Friedrich Meischer (1869): Identified DNA and named it as 'Nuclein'.
- James Watson & Francis Crick proposed double helix model of DNA.
- It was based on X-ray diffraction data produced by Maurice Wilkins & Rosalind Franklin.



THE DNA

STRUCTURE OF DNA



- DNA is made of 2 polynucleotide chains coiled in a right-handed fashion.
- Pitch of the helix= 3.4 nm (34 Å)
- Number of base pairs in each turn= 10
- Distance b/w adjacent base pairs= 0.34 nm (3.4 Å)

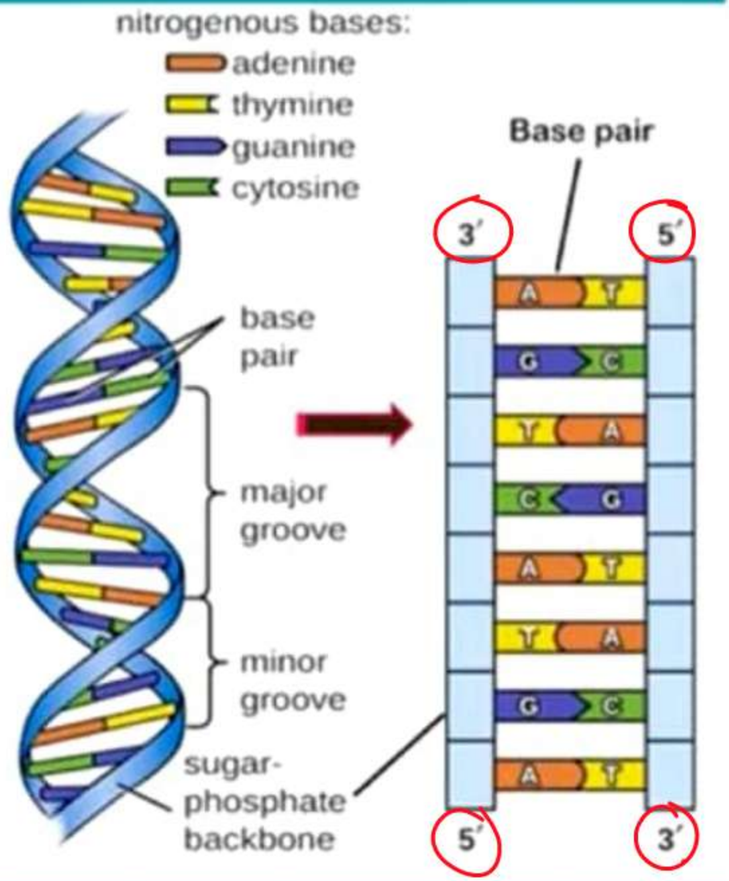
0.34 nm

THE DNA

STRUCTURE OF DNA

- Backbone of DNA is formed of sugar & phosphates.
- The bases project inside.
- The 2 chains have anti-parallel polarity, i.e. one chain has the polarity 5'→3' and the other has 3'→5'.

3'→5'

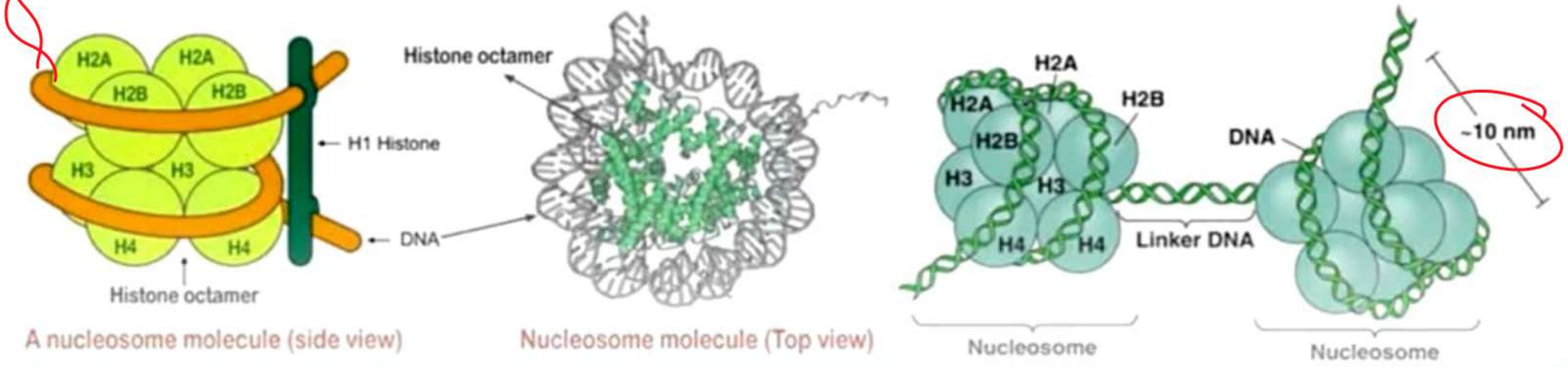


PACKAGING OF DNA HELIX IN EUKARYOTES

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

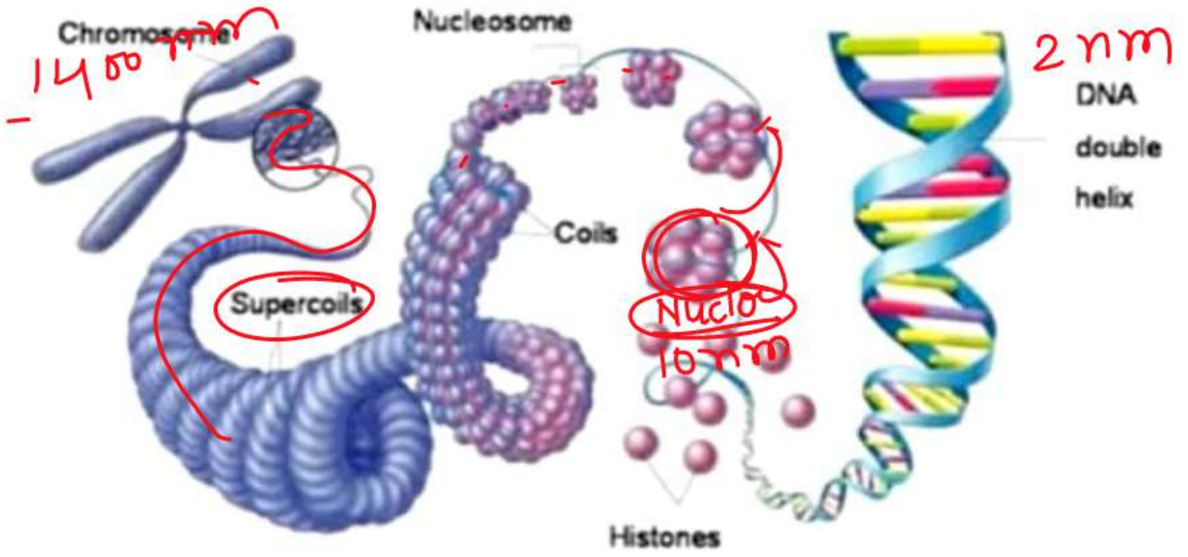
2nm

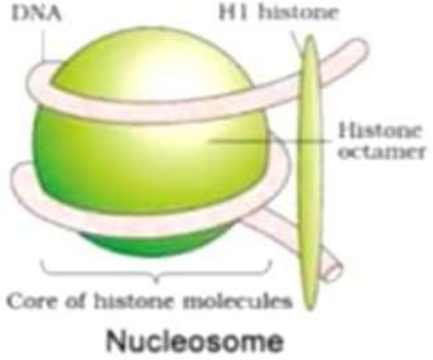
$$\frac{6.6x10^{9}bp}{200} = 3.3x10^{7}$$

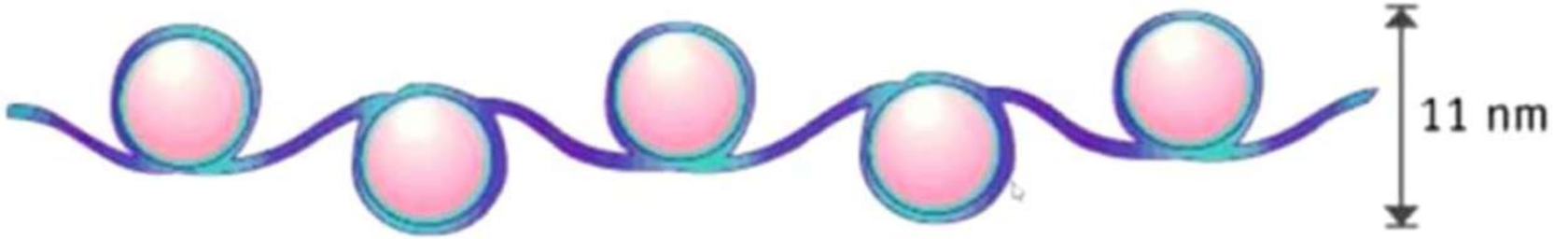


PACKAGING OF DNA HELIX IN EUKARYOTES

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







Beads-on-string form of chromatin

PACKAGING OF DNA HELIX IN EUKARYOTES

Chromatin is packaged

↓

Chromatin fibres

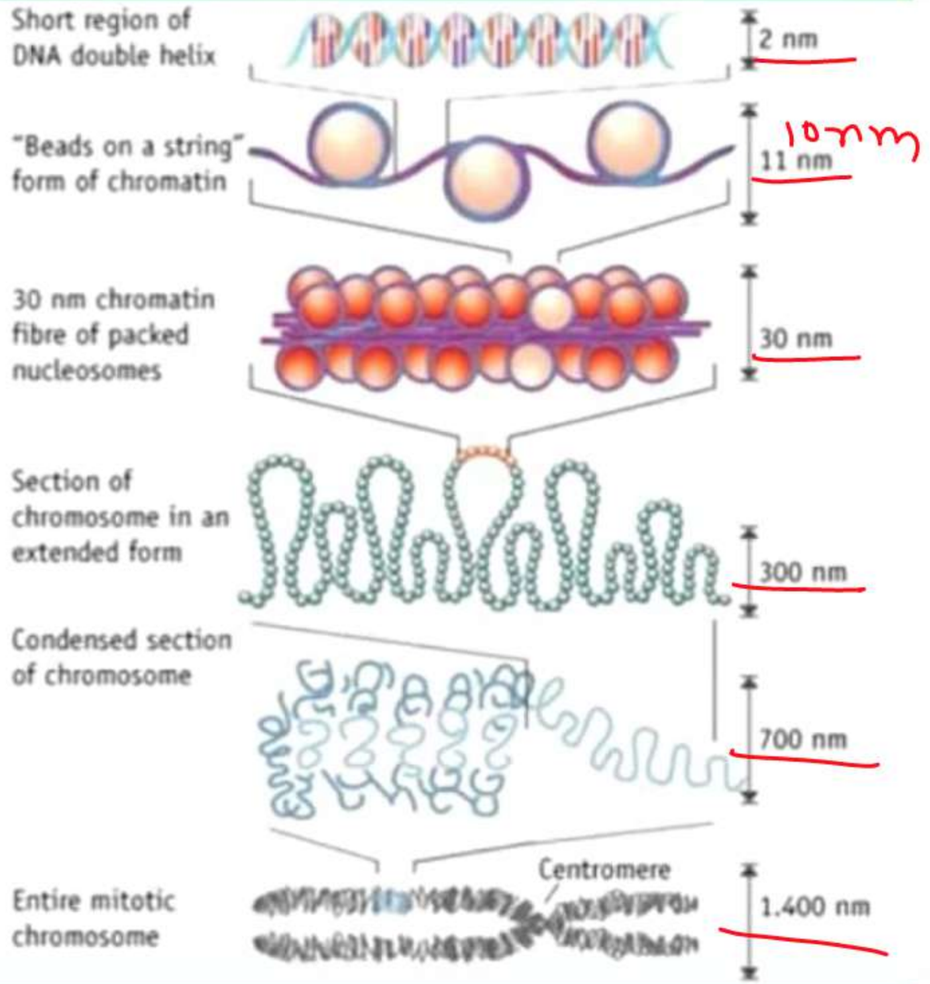
↓

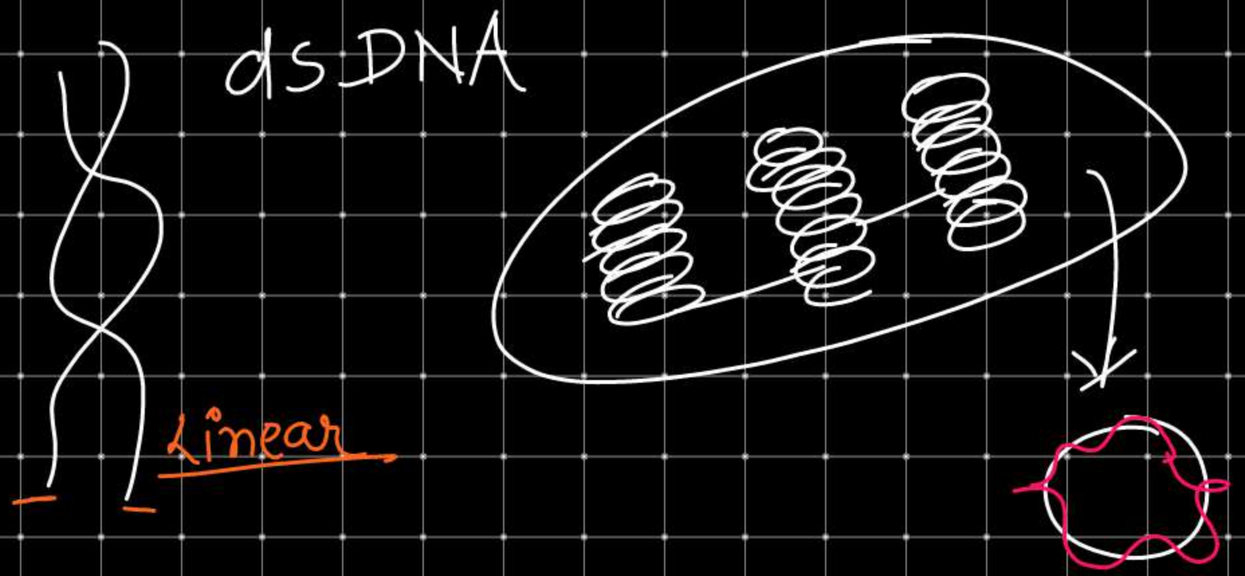
Coiled and condensed at metaphase stage

↓

Chromosomes

Higher level packaging of chromatin requires non-histone chromosomal (NHC) proteins.




dsDNA
Linear