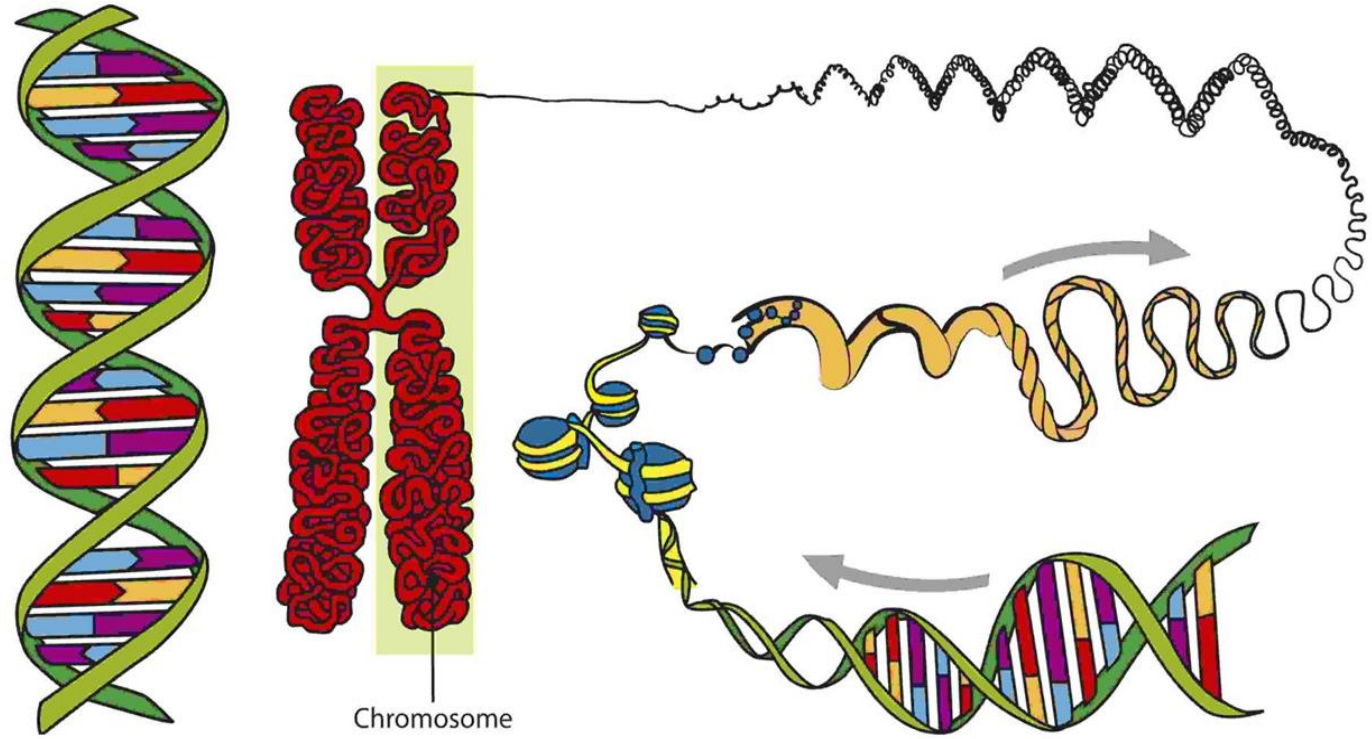
The Chromosome

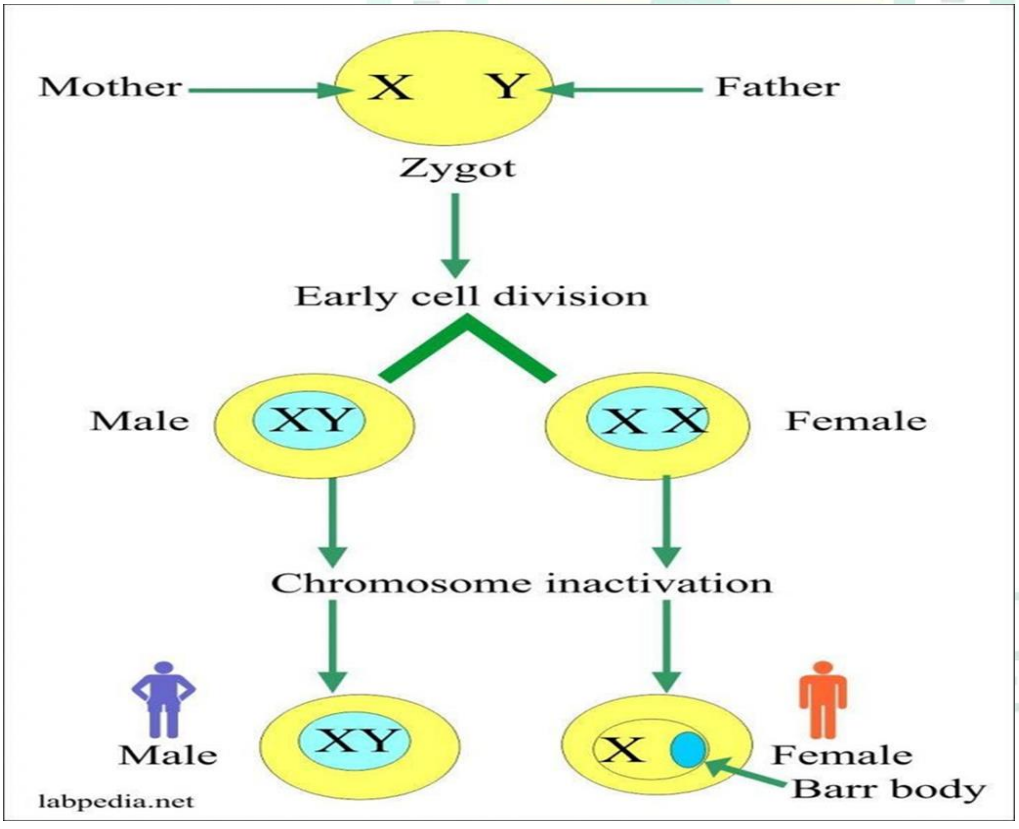
Chromosome

- A chromosome is a long DNA molecule with part or all of the genetic material of an organism. Most eukaryotic chromosomes include packaging proteins called histones which, aided by chaperone proteins, bind to and condense the DNA molecule to maintain its integrity These chromosomes display a complex three-dimensional structure, which plays a significant role in transcriptional regulation.



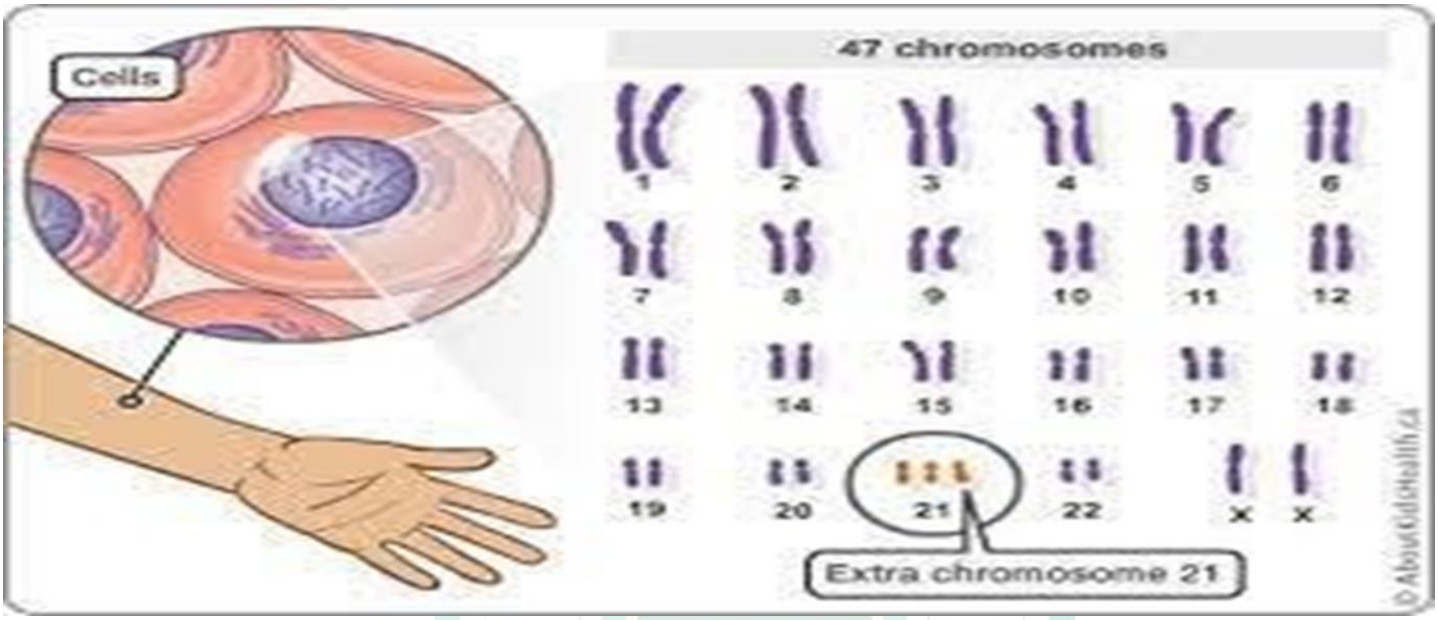
Chromosomes, the most highly condensed form of chromatin, are visible during mitosis. To form chromosomes

- The human cells contain 46 chromosomes , 44 (the somatic chromosomes), the other pair (sex chromosomes) consists of dissimilar chromosomes (XY) in males and similar ones (XX) in females.
- In females, only one X chromosome is active the inactive X chromosome is often visible as a clump of heterochromatin termed sex chromatin , or the Barr body.



Karyotyping :

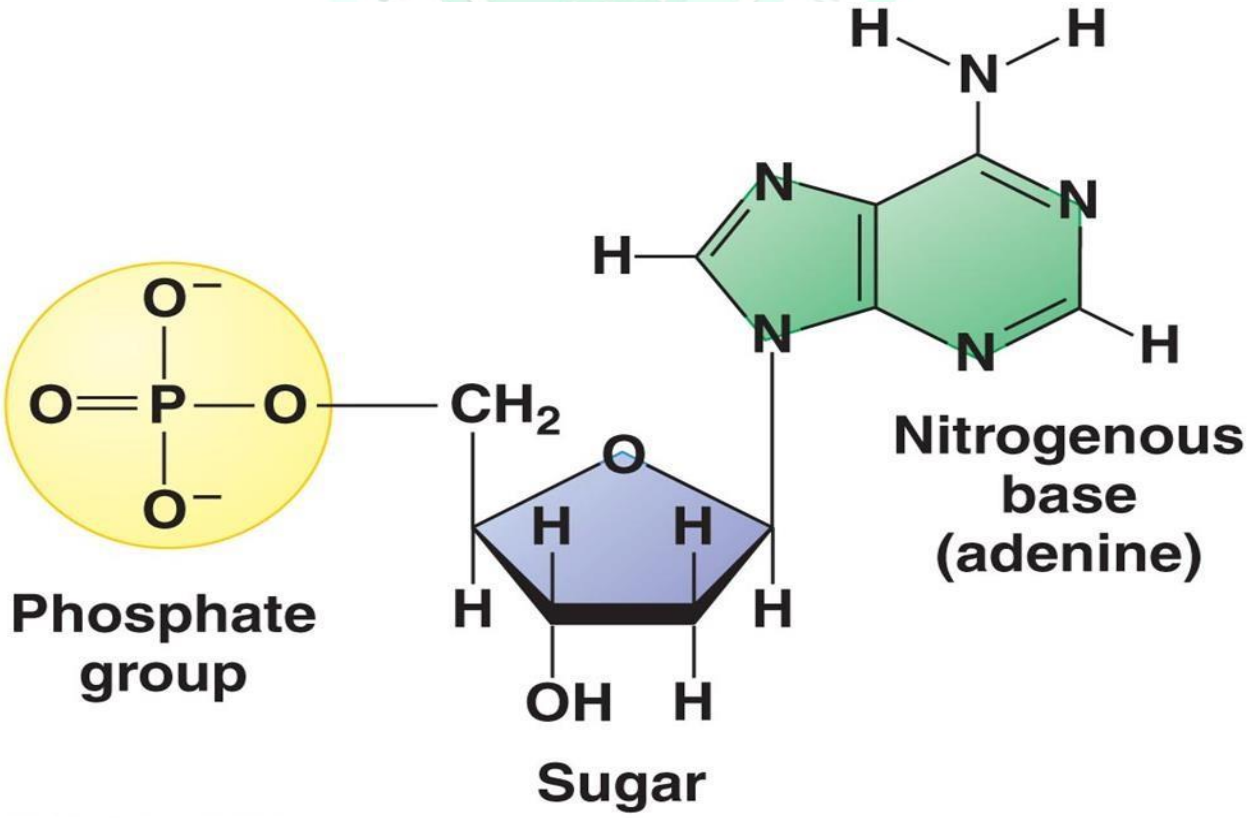
- A cell's karyotype is a picture of its chromosomes arranged by chromosome type . Preparing such a picture is called karyotyping. Cells in culture are stimulated to enter mitosis with phytohemagglutinin (a mitogen) .
- The dividing cells are treated with colchicine to arrest them in metaphase , when the chromosomes are highly coiled and visible. Lysis of the cells with a hypotonic solution causes the chromosomes to spread out on the slide with little or no overlapping .
- The chromosome spread is photographed, and pictures of the chromosomes are cut out, paired, and assembled into a specific sequence. Karyotyping allows cataloging of chromosomes for detection of structural abnormalities and deleted or excess chromosomes.
- **Down syndrome** : is a condition in which a child is born with an extra copy of their 21st chromosome — hence its other name trisomy 21 . This causes physical and mental developmental delays and disabilities.

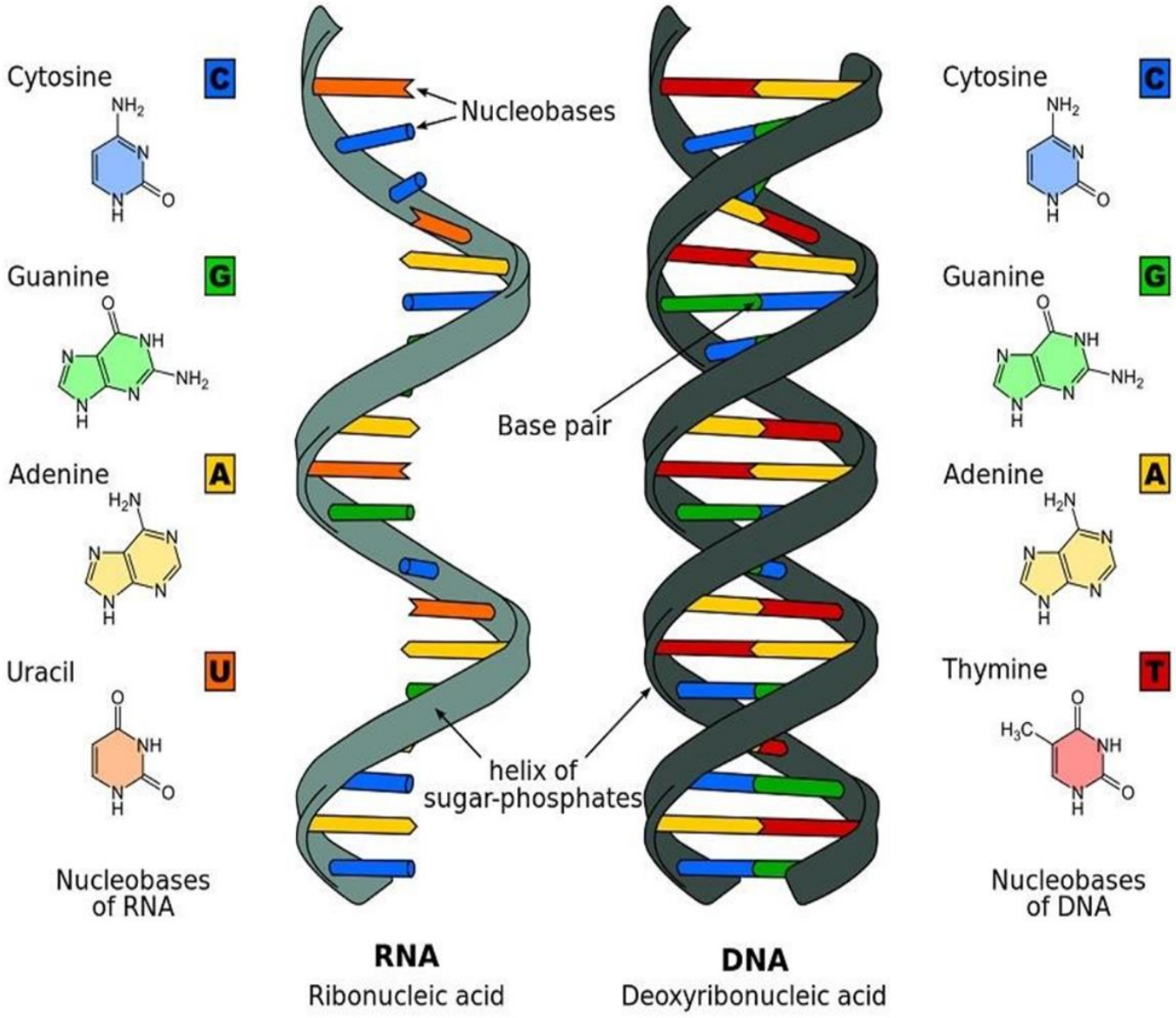


Nucleic acids structure

- Nucleic acids are large polymers consisting nucleotide units.
- Each nucleotide contains one phosphate group, one pentose or deoxy-pentose sugar , and one purine or pyrimidine base.
- In DNA the sugar is D-2-deoxyribose; in RNA the sugar is D-ribose.
- In DNA the purine bases are adenine (A) and guanine (G), and the pyrimidine bases are thymine (T) and cytosine (C).

- in RNA the purine bases are adenine (A) and guanine (G), and the pyrimidine bases are Uracil (U) and cytosine (C)
- The repeating structure of polynucleotides involves alternating sugar and phosphate residues, with phosphodiester bonds linking the 3'-hydroxyl group of one nucleotide sugar to the 5'- hydroxyl group of the next nucleotide sugar.
- A purine or pyrimidine base is linked at the 1'-carbon atom of each sugar group and projects from the repeating sugar- phosphate backbone.
- dsDNA is helical , and the two strands in the helix are antiparallel. The double helix is stabilized by hydrogen bonds between purine and pyrimidine bases on the opposite strands.






Thank You