



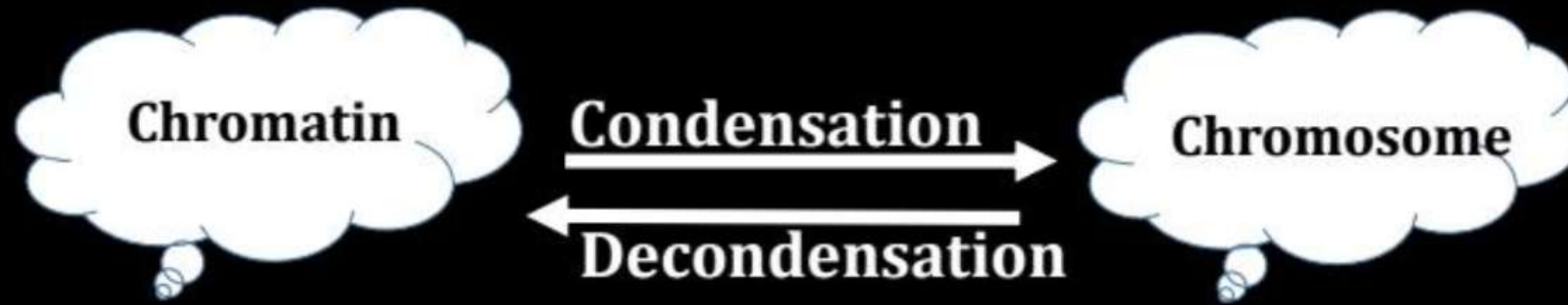
ARJUNA NEET BATCH



CELL THE UNIT OF LIFE

By : Biswajit Sir

Chromosomes:-



- ☐ Interphase
- ☐ Long thin
- ☐ Indistinct
- ☐ nondividing cells

- ☐ M-Phase
- ☐ Short thick
- ☐ Distinct
- ☐ In dividing cells

Components of chromosome

(1) Pellicle

Proteinaceous covering of chromosomes.

(2) Matrix

- **Semifluid present inside pellicle.**
- **Contains minerals, enzymes, ions**

(3) Primary Constriction

- **Known as Centromere**
- **It's position is variable.**
- **Posses disc shaped, small proteinaceous Kinetochore (Binding site for spindle fibre) complex on its both side.**

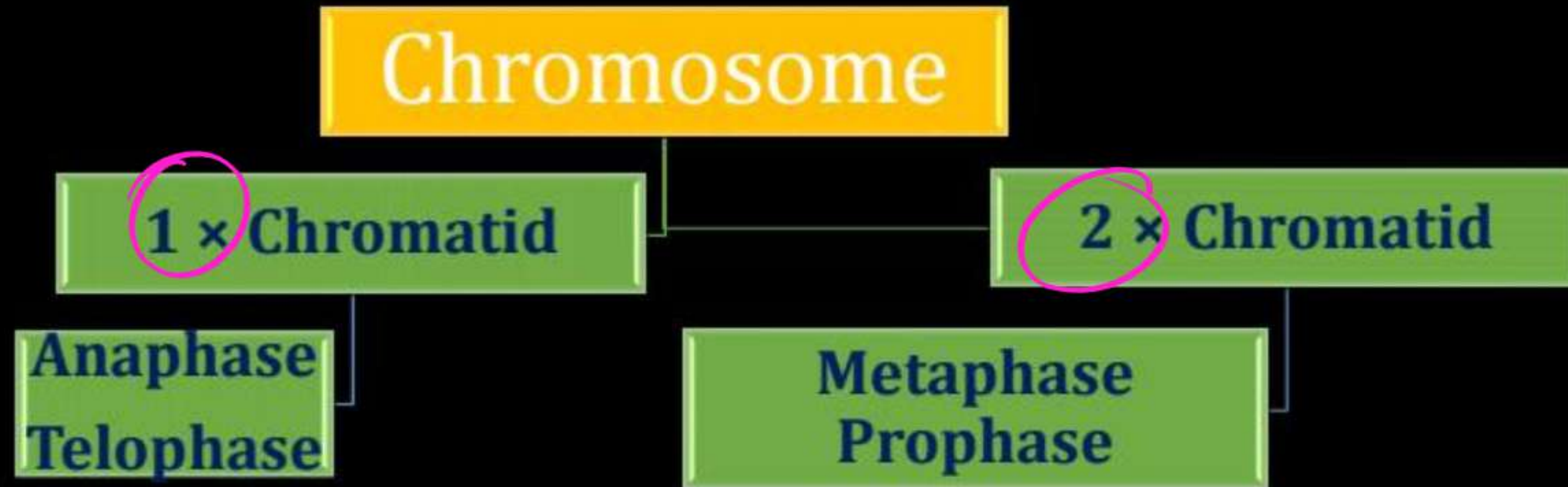
(4) Secondary Constriction

- ☐ Present in certain and few chromosomes at constant location.
- ☐ Part of chromosome beyond secondary constriction is satellite.
- ☐ Chromosomes having satellite are called SAT (Sine Acid Thymonucleinico) chromosomes
- ☐ In human 5pairs of SAT chromosomes – 13, 14, 15, 21, 22

(5) Telomere

- ☐ End of linear chromosome.
- ☐ Seals and protects the chromosome from nuclease.
- ☐ Its DNA is called telomeric DNA.
 - (1) Synthesized by telomerase
 - (a) Ribonucleo protein.
 - (b) Marker in tumor cell.
 - (2) Grich and 4 stranded.

(6) Chromatids

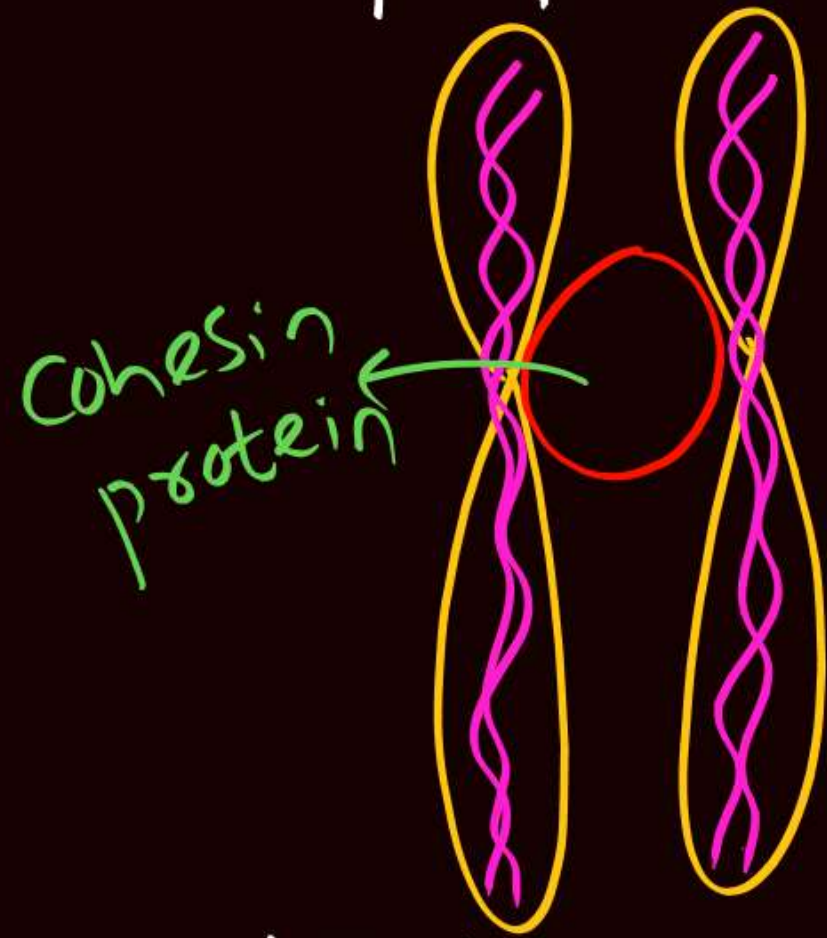


Note

1 × Chromatid – 1 × ds DNA

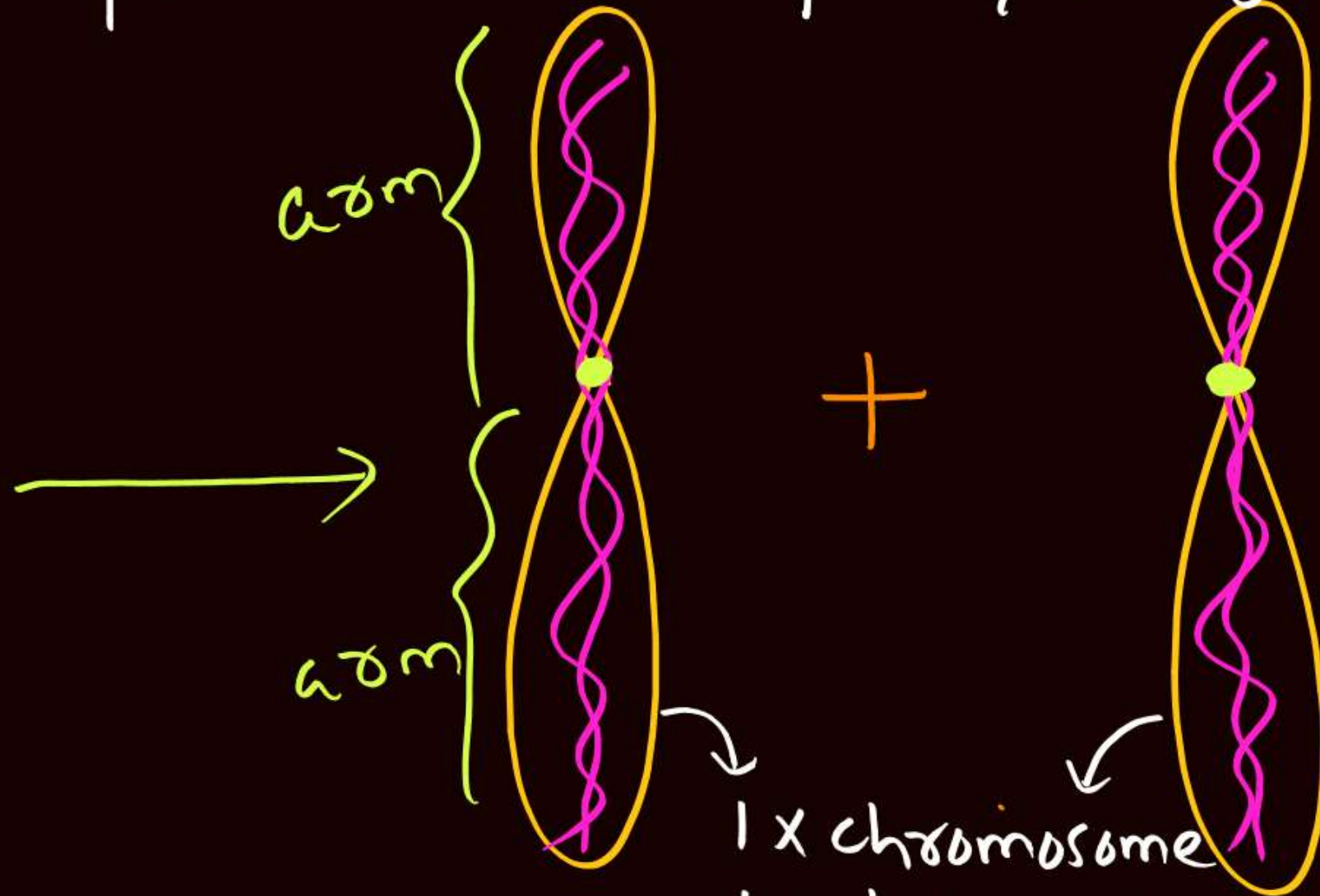
Two sister chromatids are held together at centromere by cohesion protein.

prophase/metaphase

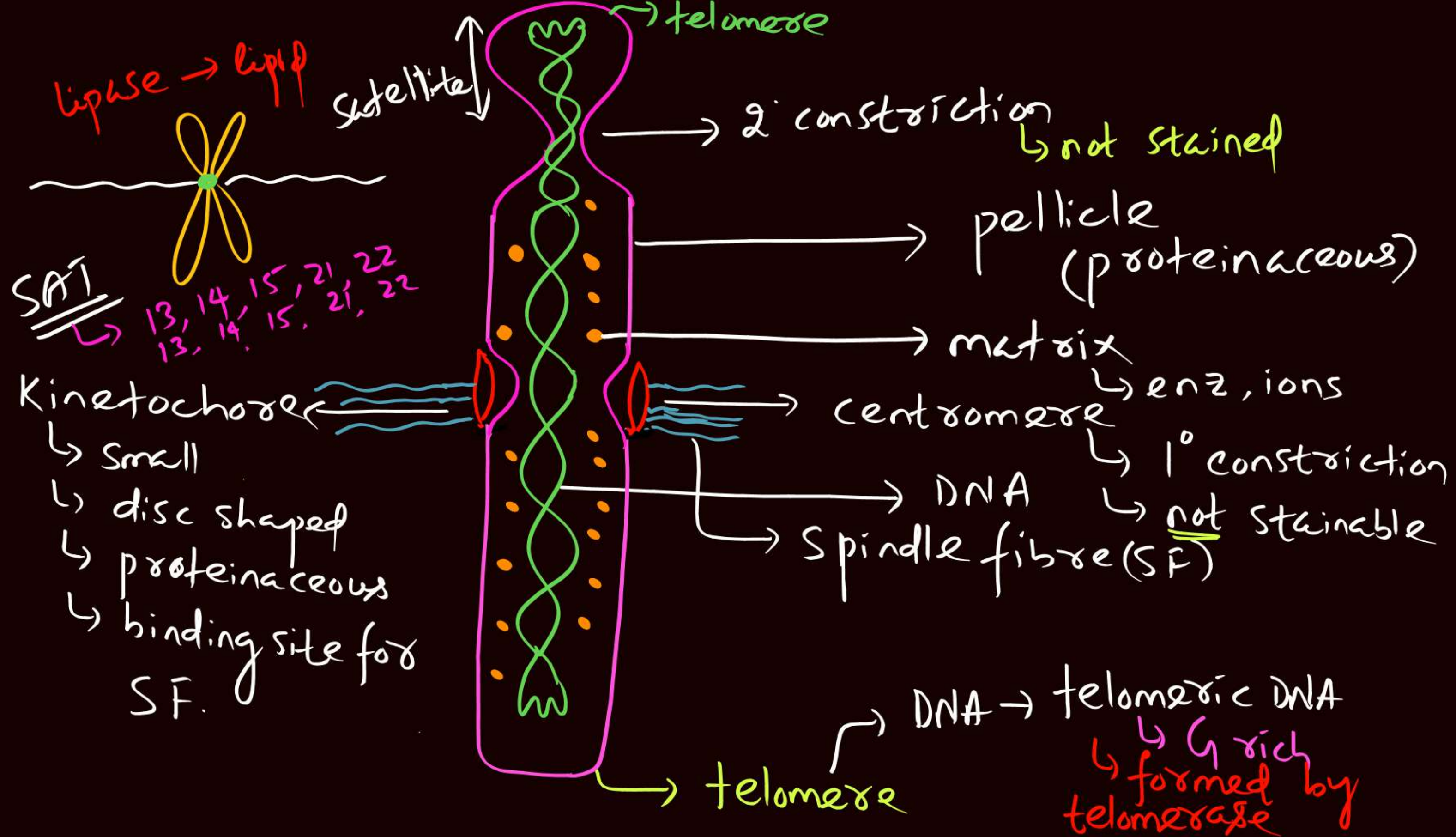


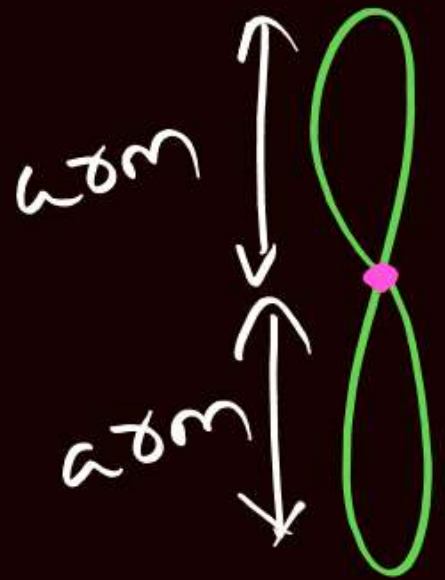
1 x chromosome
2 x chromatids
2 x ds DNA
4 x telomeres
1 x centromere

Anaphase/early telophase



1 x chromosome
1 x chromatid
1 x ds DNA
2 x telomere
1 x centromere.





⇒ metacentric

at middle of chromosome

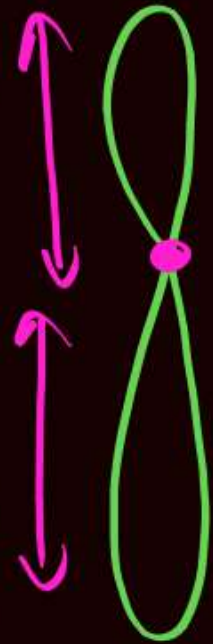
⇒ isobrachial

⇒ median

→ V shaped

(p) short arm

long arm (q)



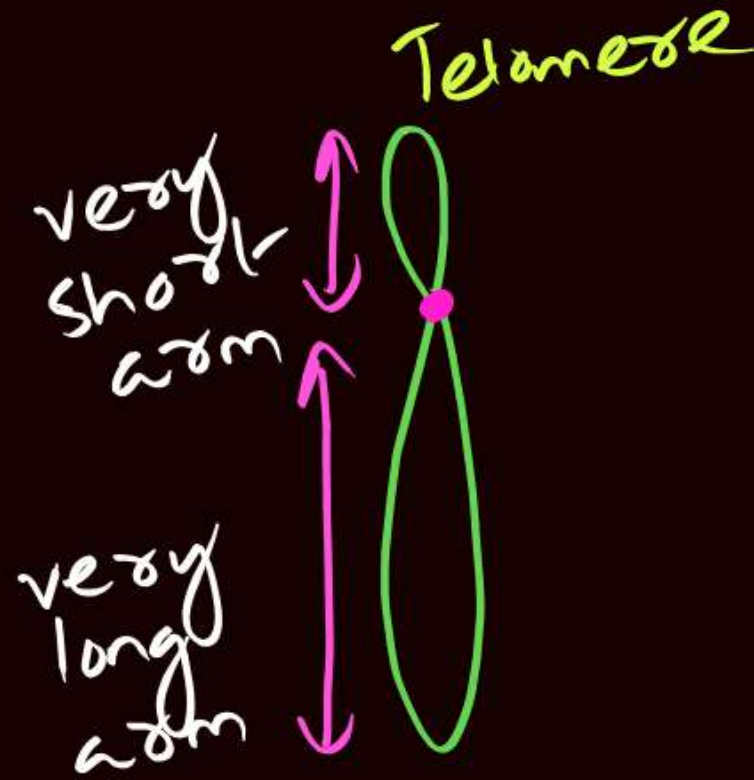
⇒ Submetacentric

near middle of chromosome

⇒ heterobrachial

⇒ submedian

→ L shape



Acrocentric

near telomere

I shaped

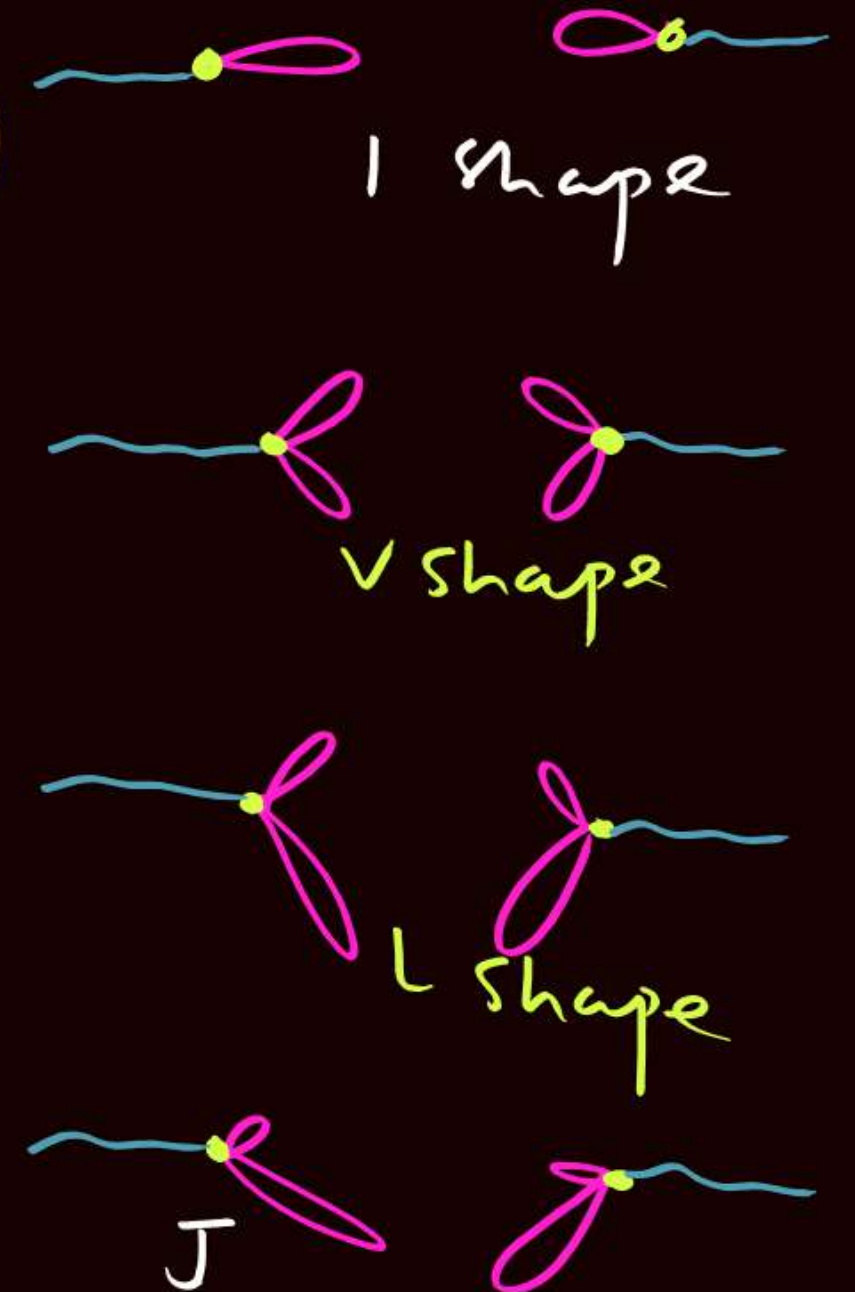
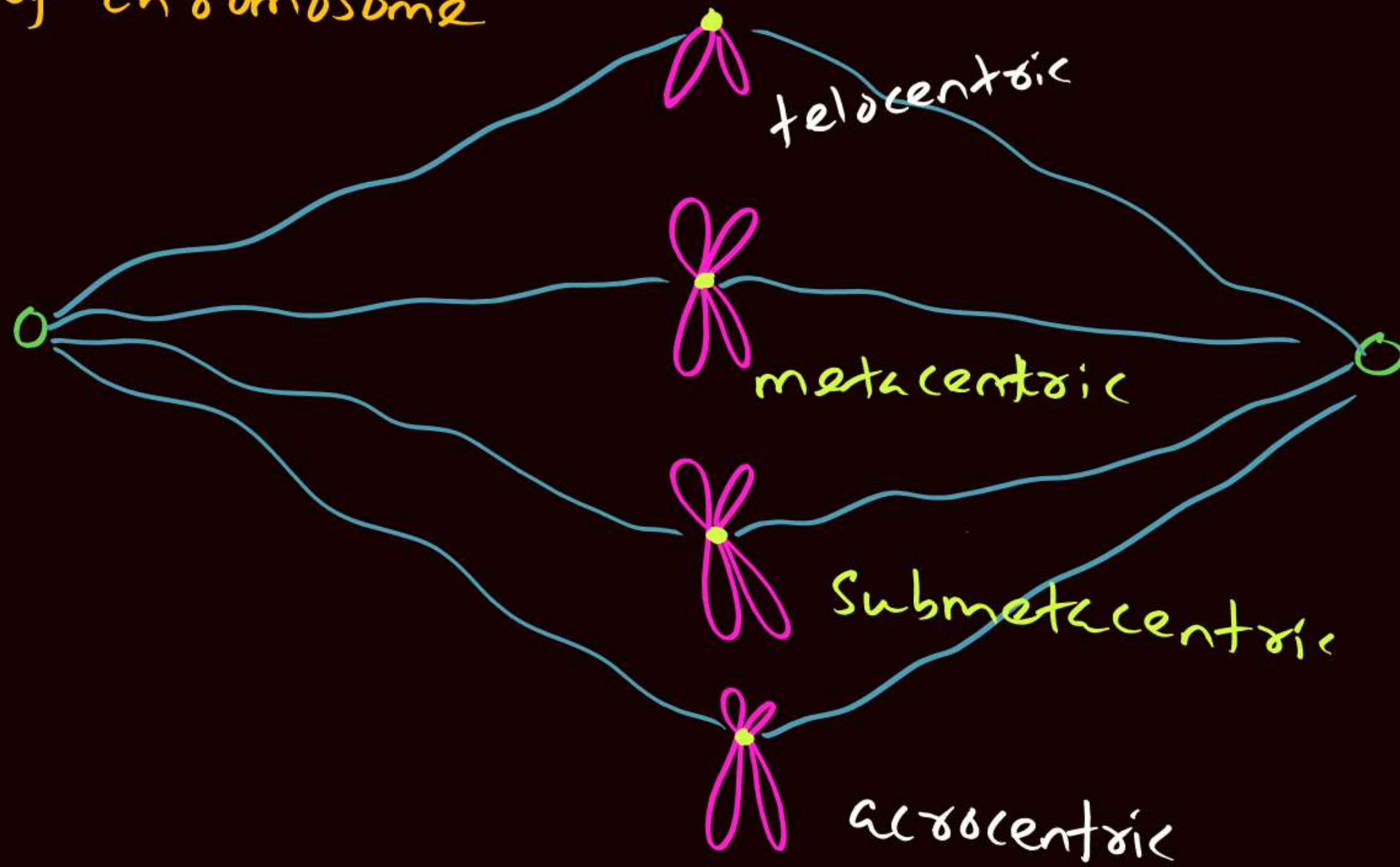


Telocentric

at telomere

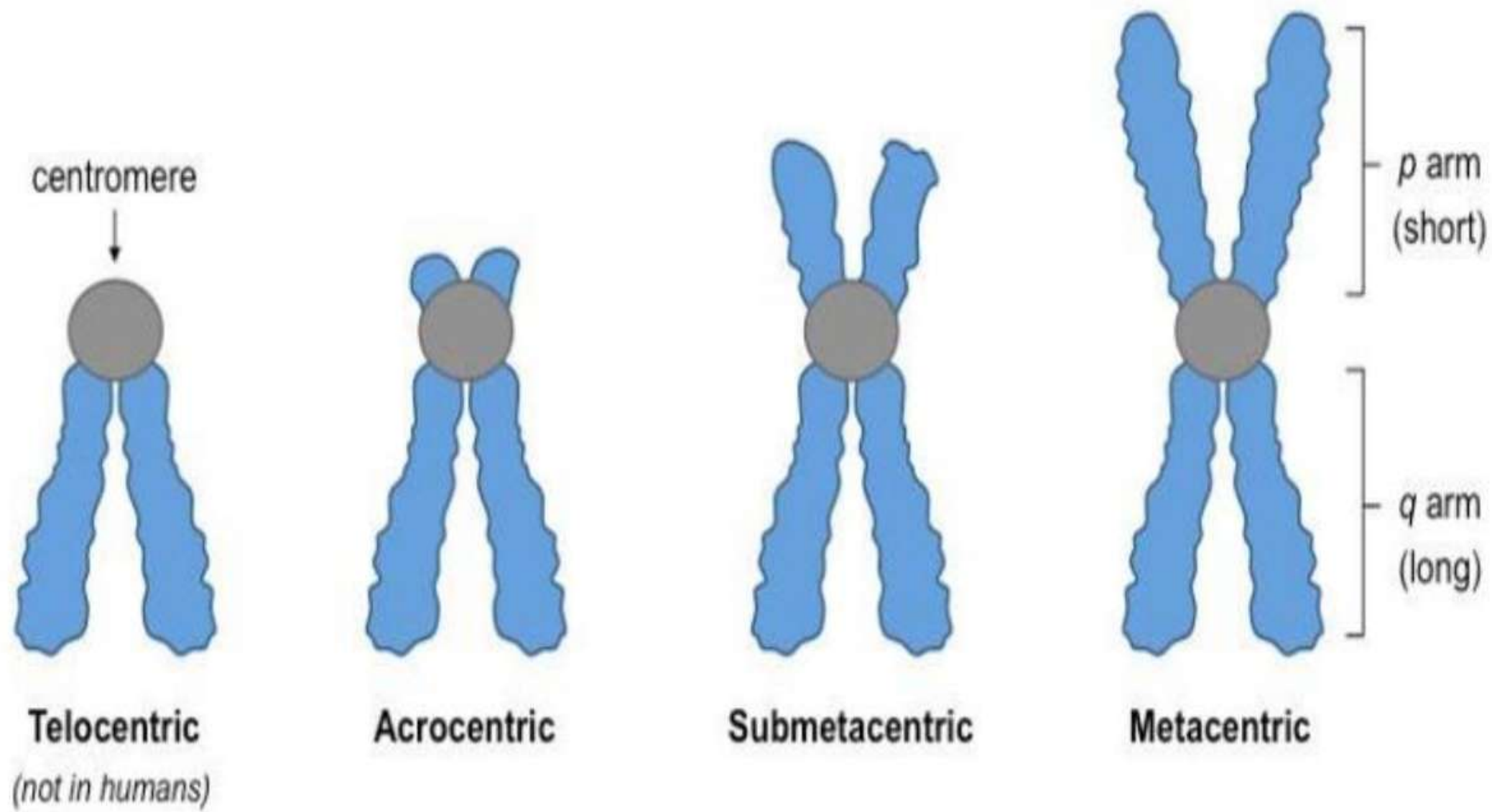
I shaped

position of centromere determines the shape of chromosome



Types of chromosome (On the basis of position of Centromere)

Chromosome	Position of Centromere	Shape	Arms
Metacentric (Median/isobrachial)	At middle of chromosome	V shape	Equal
Submetacentric (Submedian/heterobrachial)	Near middle of chromosome	L shape	Unequal 1. Short arms (P) 2. Long arms (q)
Telocentric (appear to have 1 arm)	At telomere	I shape	-
Acrocentric	Near telomere	I shape	Unequal 1 × very long 1 × very short



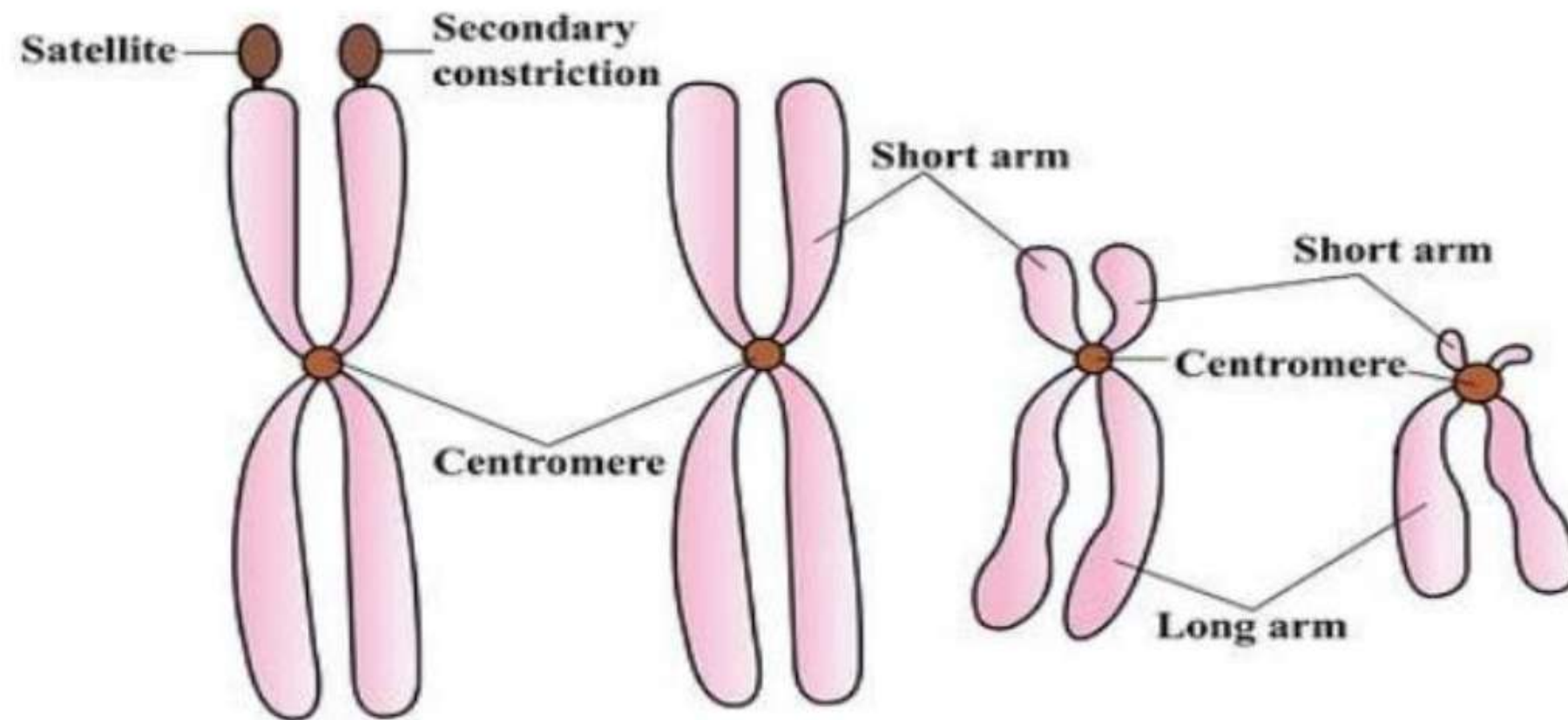
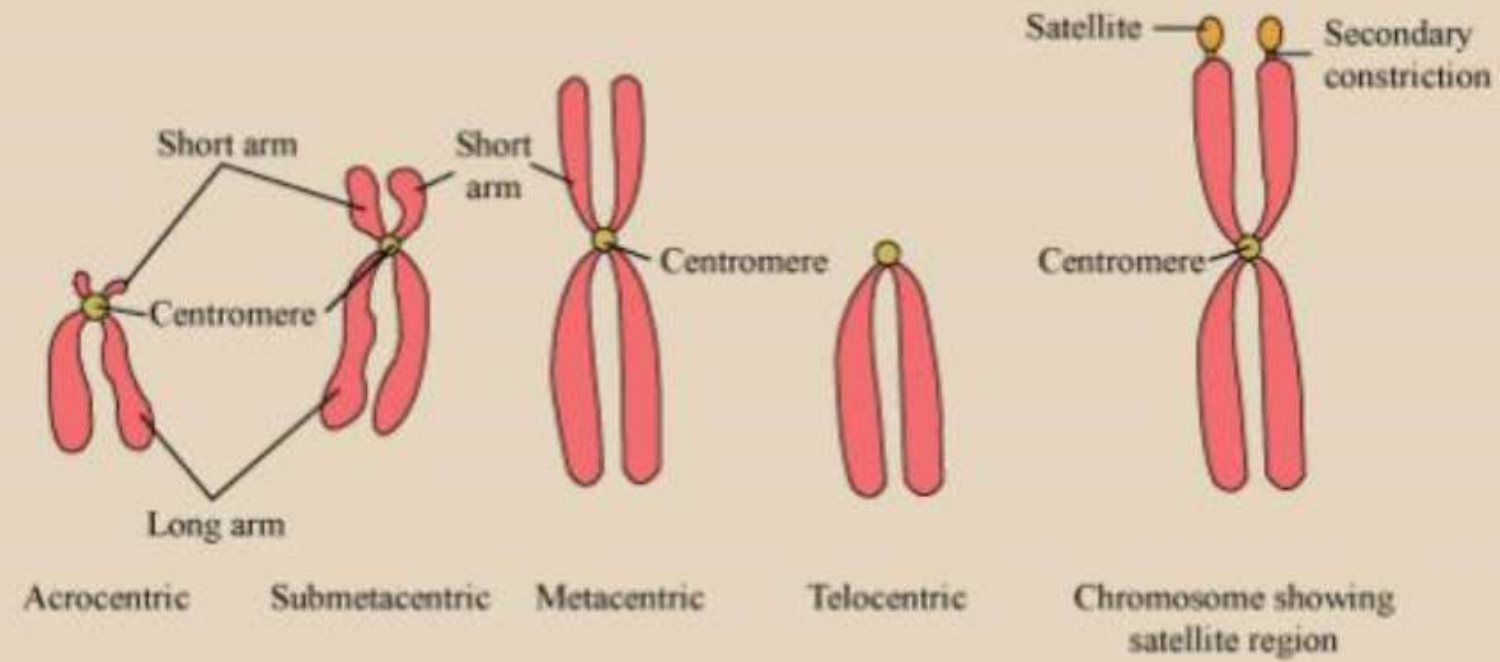


Figure 8.12 Types of chromosomes based on the position of centromere



Types of chromosomes

PROKARYOTIC CELL

- ❖ Represented by bacteria, BGA (Cyanobacteria), PPL0, *Mycoplasma*.
- ❖ Smaller and Multiply rapidly as compared to EK cells.
- ❖ PK cells – Shape and size – greatly vary.

↳ *Mycoplasma* → $0.3\mu\text{m}$

typical bac. cell → $1-2\mu\text{m}$

bacteria could be → $3-5\mu\text{m}$

4 BASIC SHAPES OF BACTERIAL CELLS

- ❖ **Rod Shape** : Bacillus (Most common shape).



Bacillus subtilis

- ❖ **Spherical** : Coccus (Most resistant form against antibiotics).



Pneumococcus pneumoniae

- ❖ **Comma** : Vibrio



Vibrio cholerae

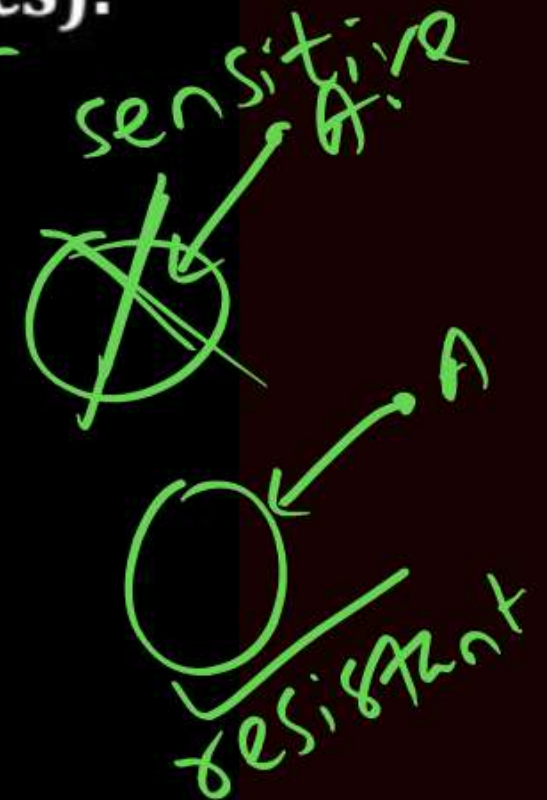
- ❖ **Spiral** : Spirillum



Rhodospirillum

Note:

Organisation of PK cell is fundamentally similar even though prokaryotes exhibit a wide variety of shapes and functions



ULTRASTRUCTURE OF TYPICAL BACTERIAL CELL

Bacterial Cell

Cell envelope, Cytoplasm, Nucleoid, Inclusion bodies. Plasmids and Surface appendages.

(a) Cell envelope :

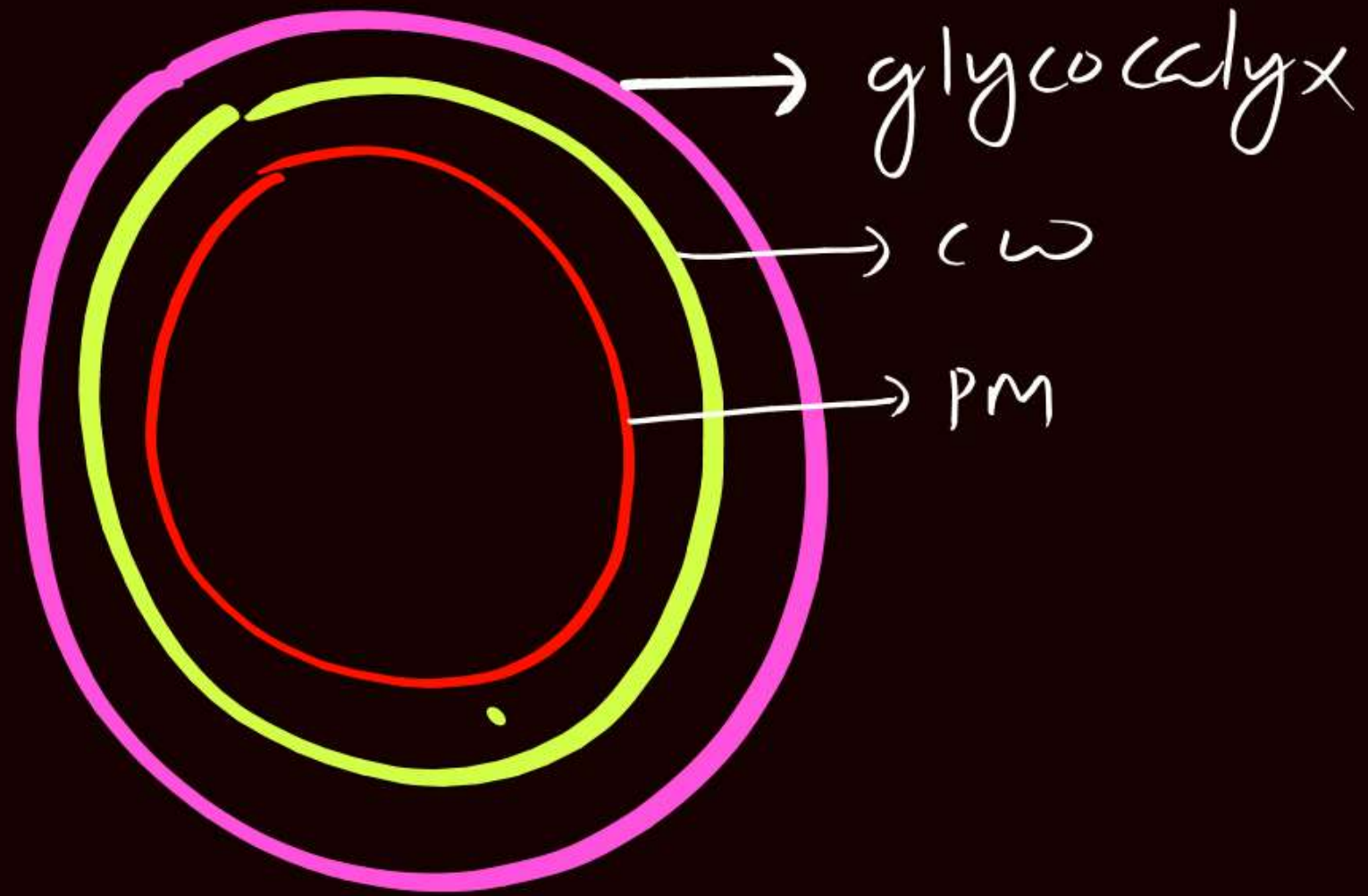
❖ Chemically complex in many cells particularly in bacterial cells.

❖ Made of
 Glycocalyx + Cell Wall + Plasma membrane
 (Outer) (Middle) (Inner)

Each component has its own function

- Tightly bound to each other
- Together act as a protective unit.

has its own function.



∴ (bac. cell)

(i) Glycocalyx (Mucilage sheath)

- ❖ **Chemical composition and thickness – vary**
chemical composition : Non cellulosic polysaccharide (polypeptide) protein or both (mucopeptide)

Types:

(a) Capsule :

- (i) Thick, tough glycocalyx
- # (ii) Gives sticky and gummy character to bacterial cells.
- # (iii) Responsible for pathogenicity (Virulence).
 ↳ *Pneumococcus pneumoniae*
- # (ii) Helps bacterial cells to hide from immune system.

(b) Slime Layer :

(i) Thin, loose sheath

(ii) Prevents loss of H_2O and nutrients from cells.

↓
Prevents desiccation (Dryness)

