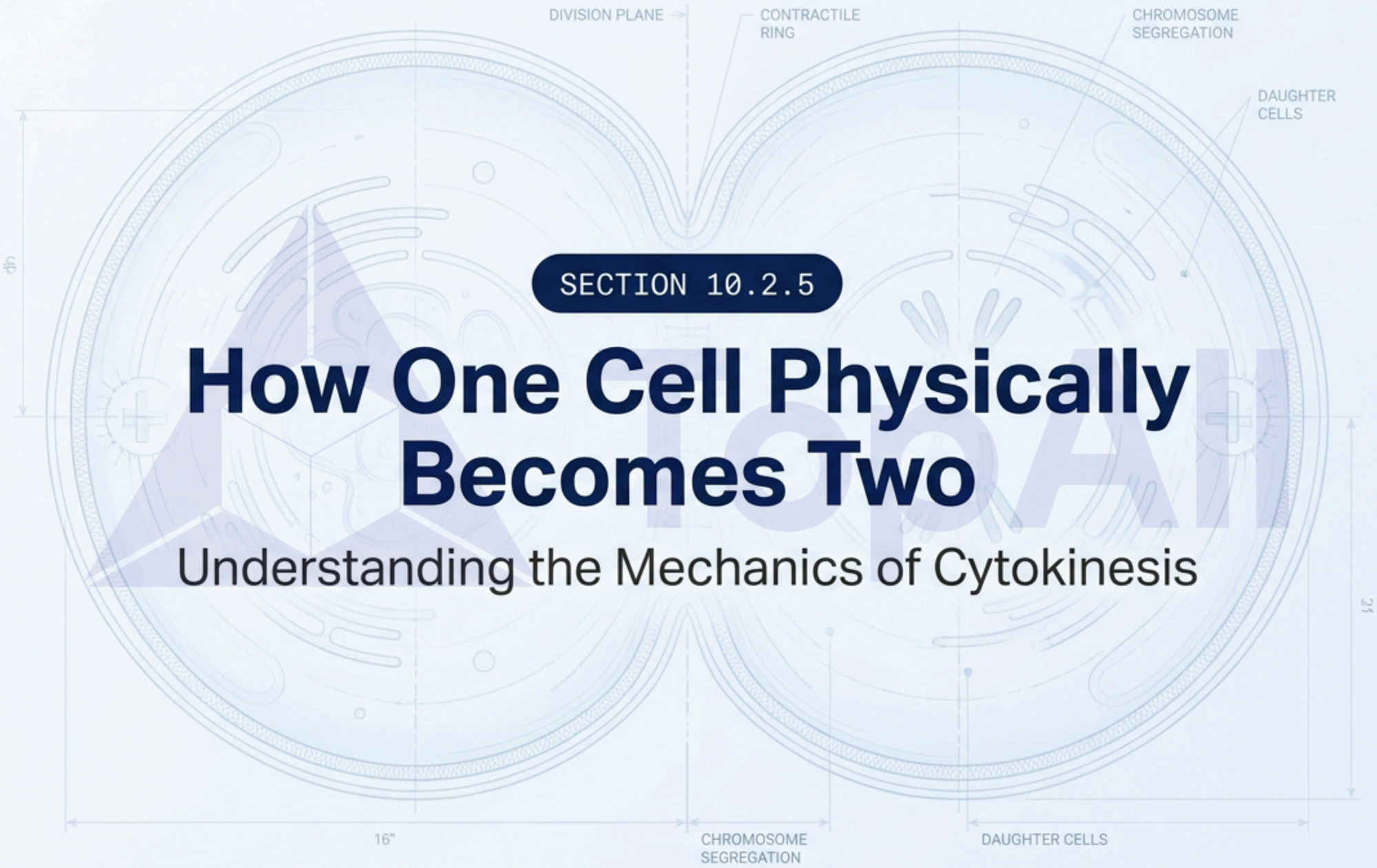

SECTION 10.2.5

How One Cell Physically Becomes Two

Understanding the Mechanics of Cytokinesis

TopAll

Completing the Division

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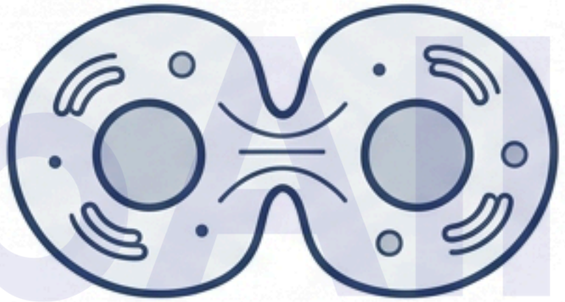
Karyokinesis

The segregation of duplicated chromosomes into daughter nuclei.

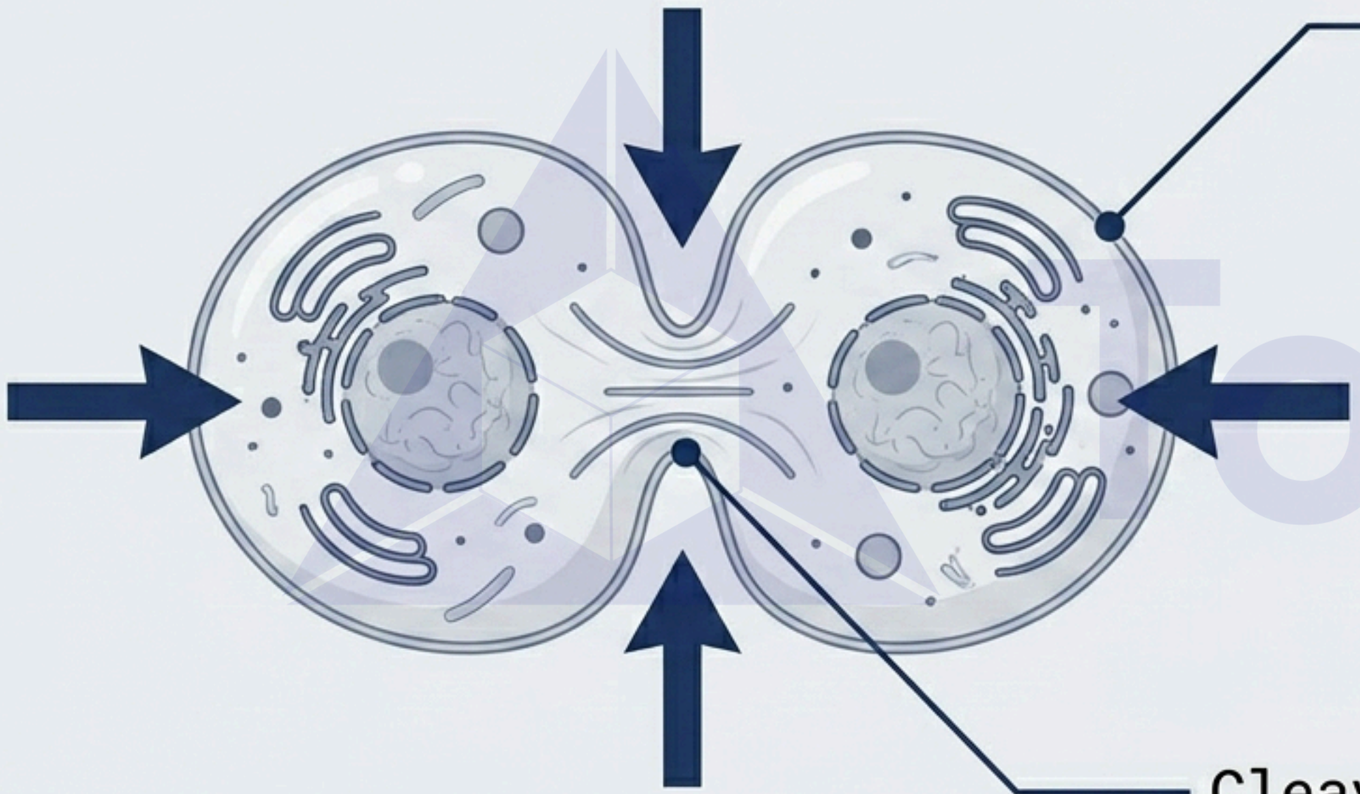
Cytokinesis



The physical separation of the cytoplasm, completing cell division.

Karyokinesis + Cytokinesis = Complete Mitosis

Animal Cells: The Cleavage Furrow



Achieved by a furrow appearing in the flexible plasma membrane. The furrow gradually deepens and ultimately joins in the center, dividing the cytoplasm into two.

Outside-In Force (Centripetal)

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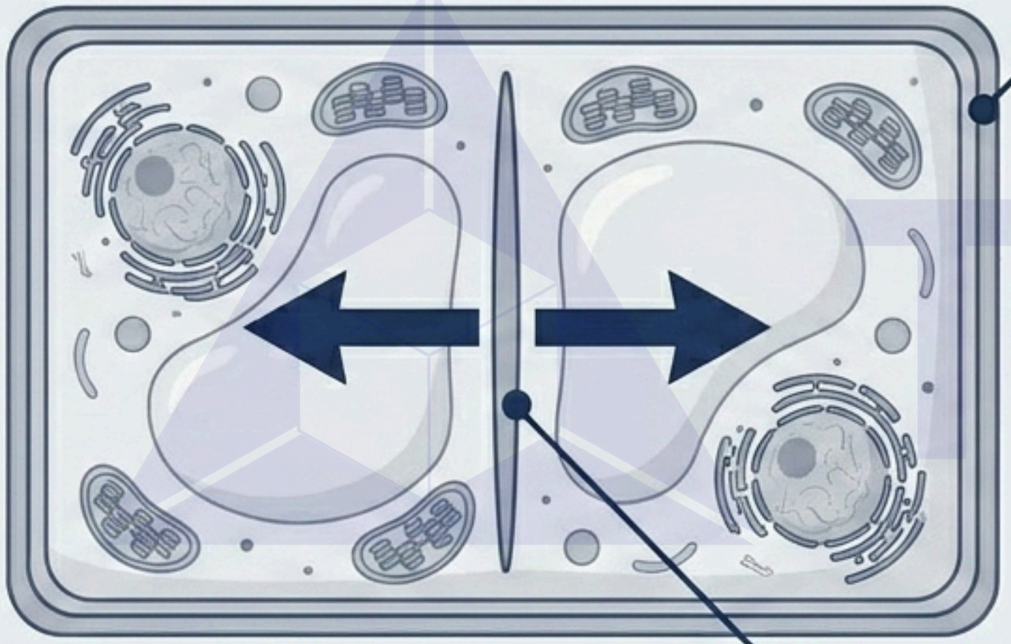
Plant Cells: The Cell Plate



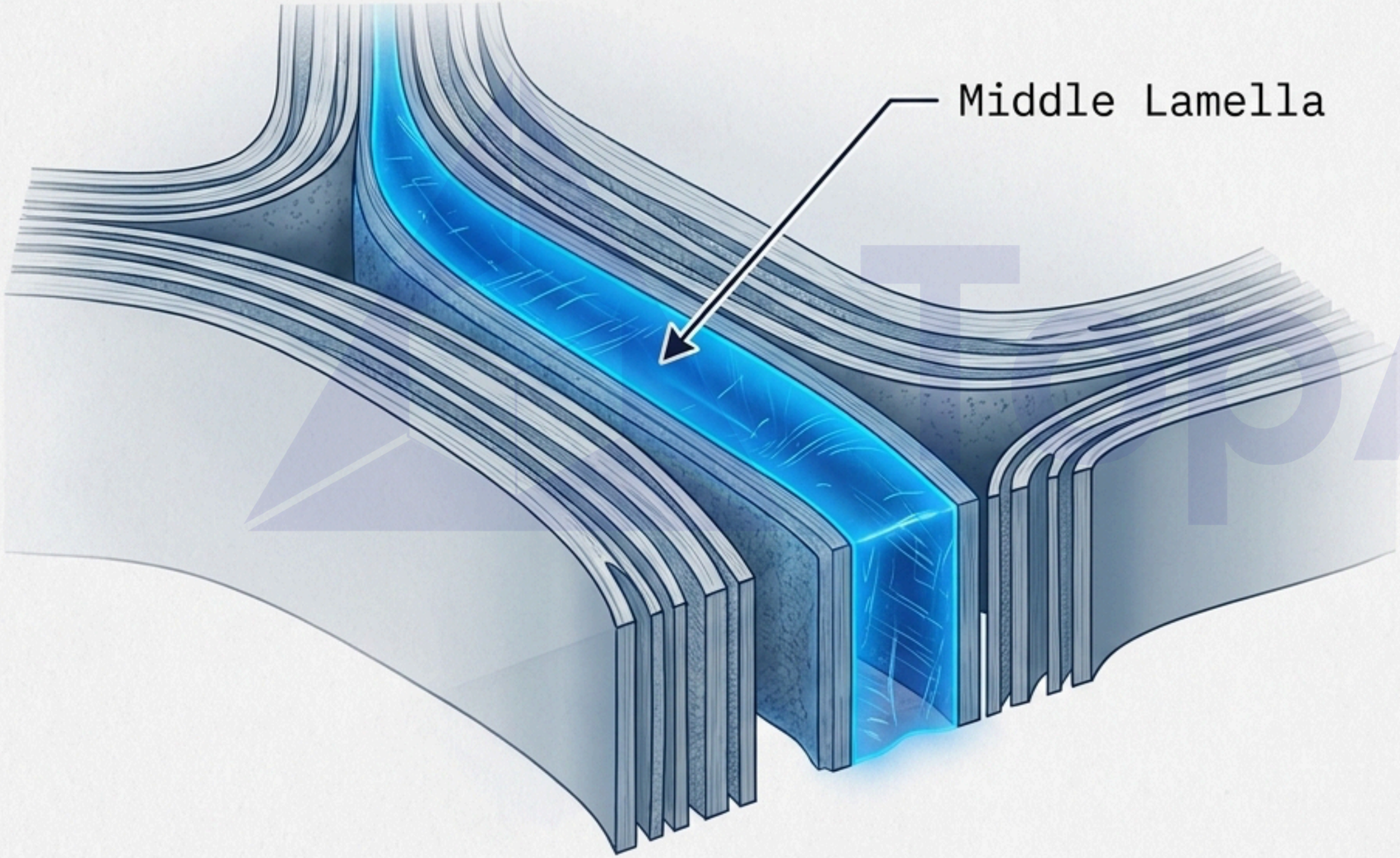
Inextensible Cell Wall

Plant cells are enclosed by a rigid wall. Wall formation starts in the center of the cell and grows outward to meet the existing lateral walls.

Cell-Plate Precursor

Inside-Out Force (Centrifugal)

The Future Middle Lamella

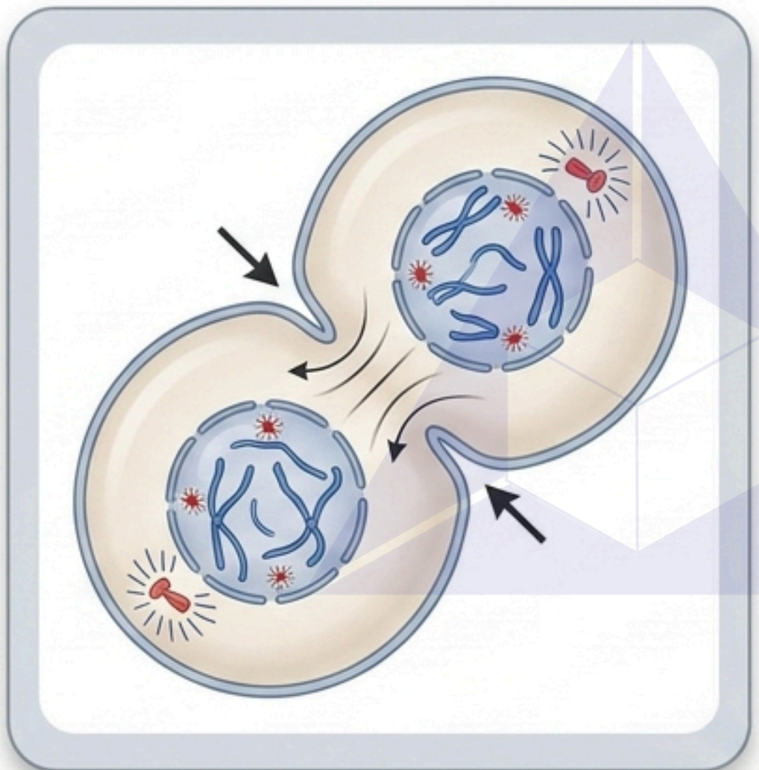


The simple cell-plate precursor eventually matures into the middle lamella between the walls of two adjacent cells.

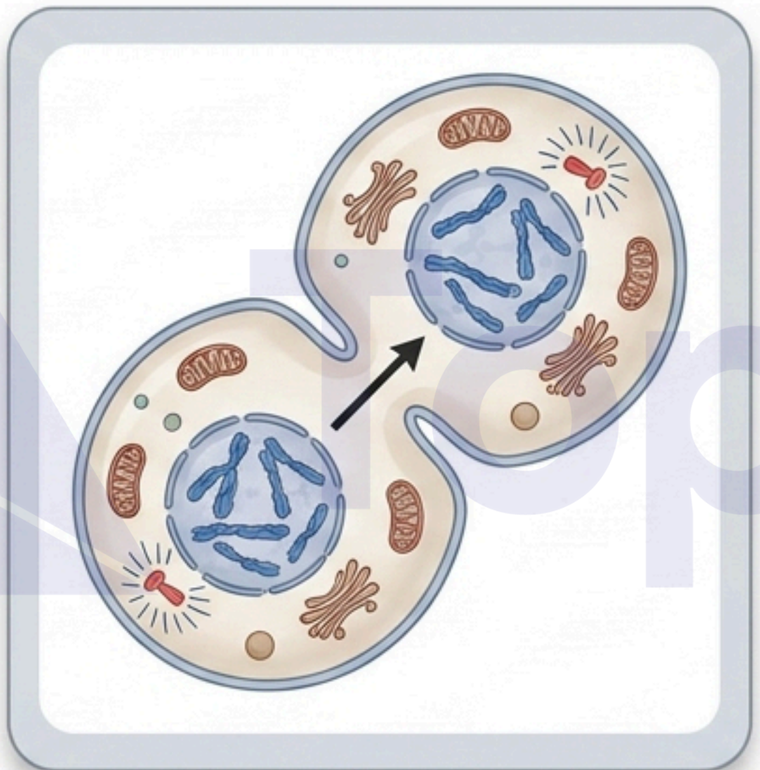
Organelle Distribution

During cytoplasmic division, organelles like mitochondria and plastids get evenly distributed between the two daughter cells.

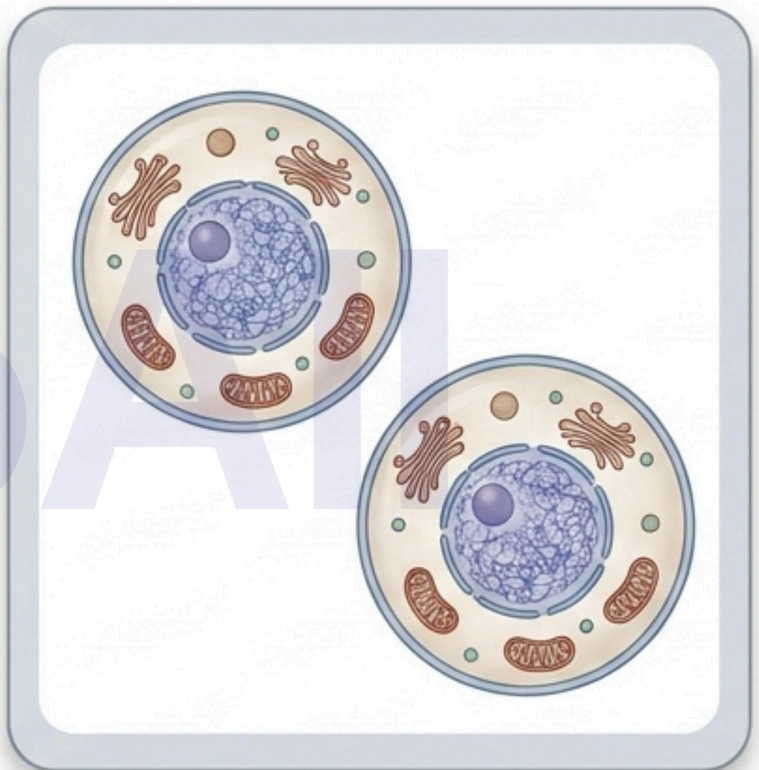
The Final Separation



Telophase



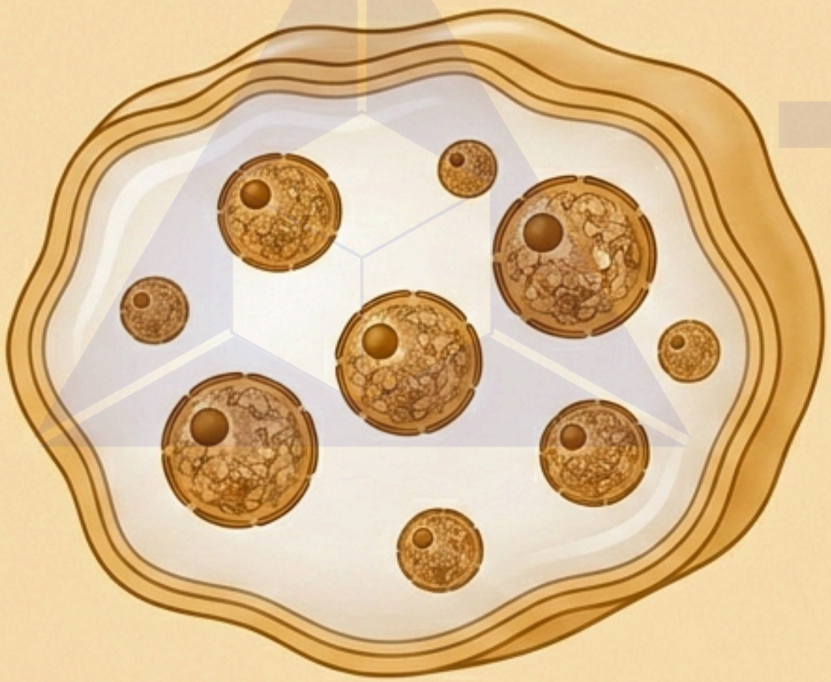
Cytokinesis



Interphase

The Multinucleate Condition

Syncytium



Occurs when karyokinesis is not followed by cytokinesis. The result is a single cell containing multiple nuclei.

Example: Liquid endosperm in coconut.

Summary & Key Takeaways

Cytokinesis completes cell division, adapting its mechanics to the structural limits of the organism.

Animal Cells	Plant Cells
Cleavage Furrow	Cell Plate
Flexible Plasma Membrane	Rigid Inextensible Cell Wall
Outside-In (Centripetal)	Inside-Out (Centrifugal)

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